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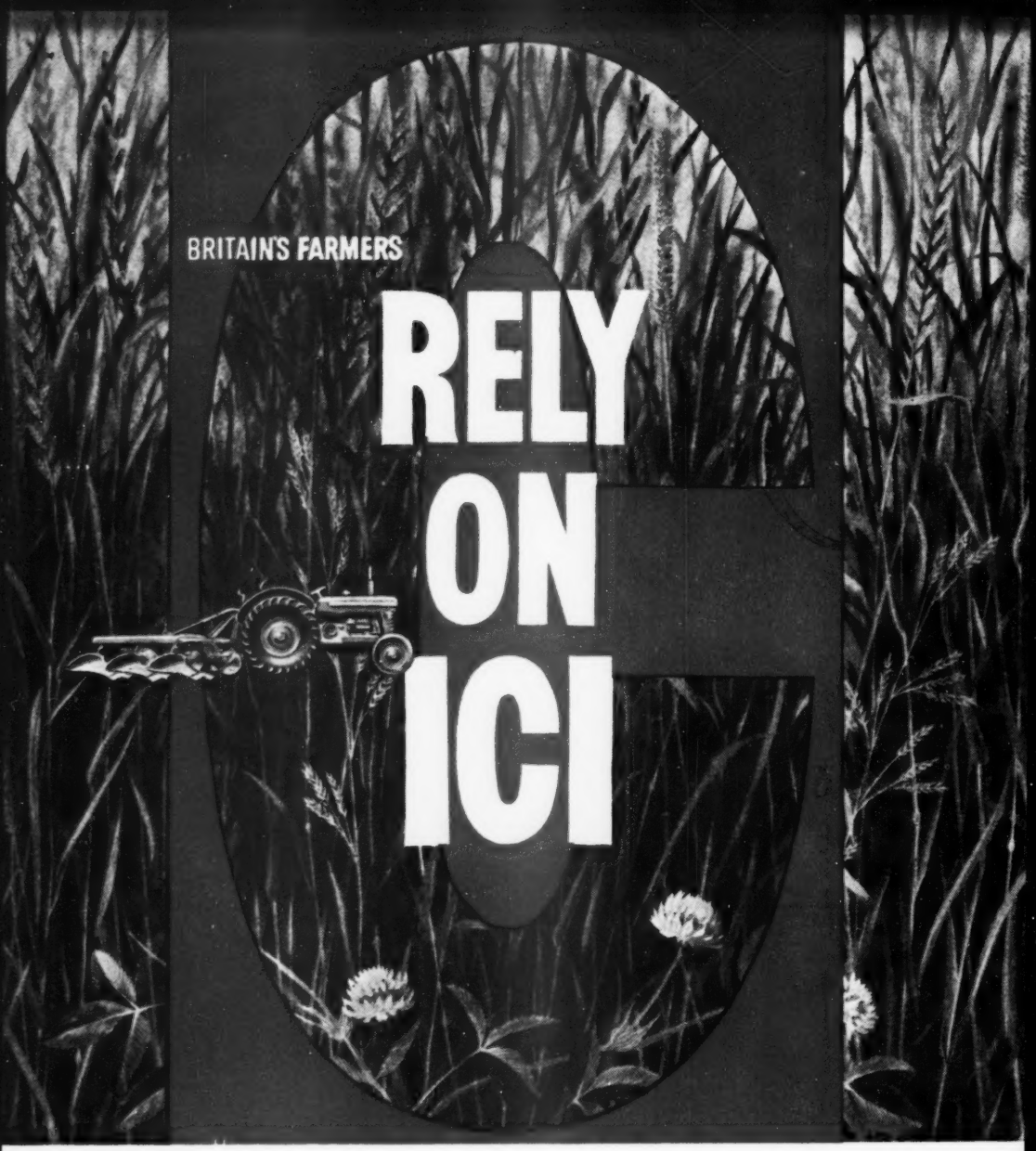
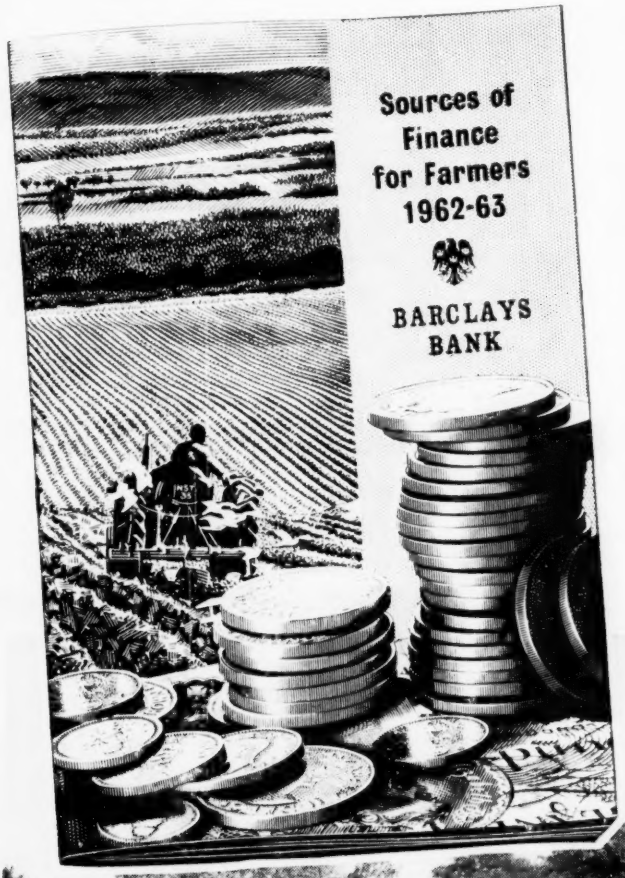


"Studies made by University agricultural economists, with no axes to grind and no ulterior motive in singing the praises of particular farm practices, are showing that additional expenditure on fertilizers usually yields a higher return than spending money in any other direction on the farm." **FARMING FOR PROFITS** *by Keith Dexter & Derek Barber (Penguin Books)*



'Sources of Finance for Farmers'

1962-1963

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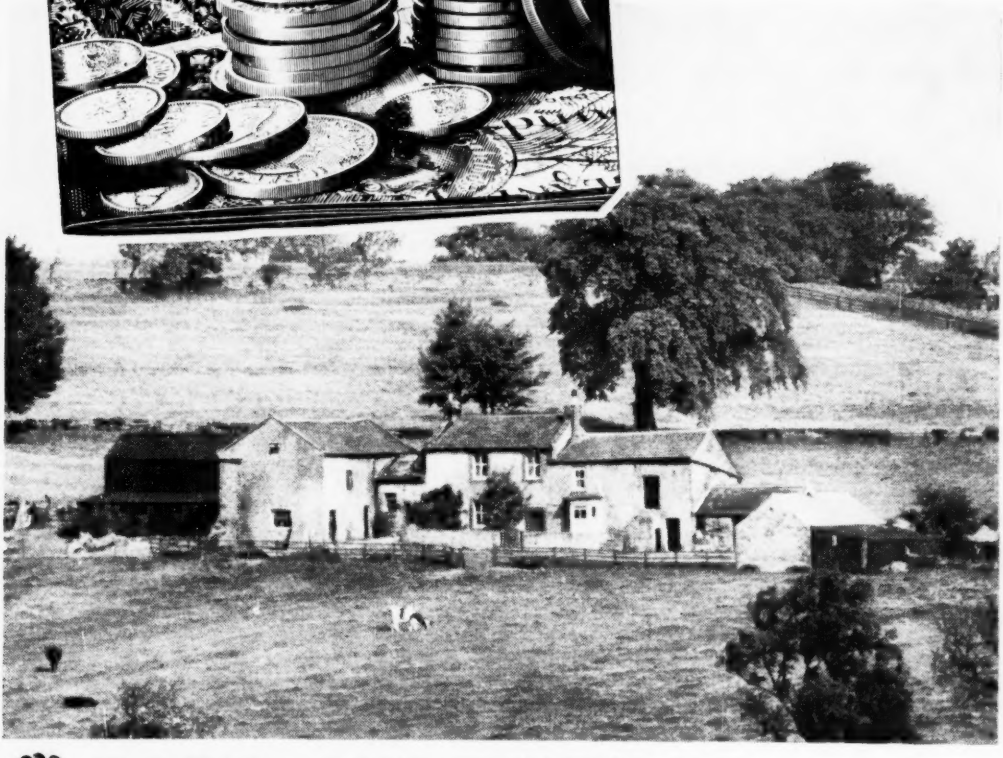

BARCLAYS BANK ***'Money is our business'***

Agriculture

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GUN SAFETY

THIRTEEN people shot dead! That is last year's figure of fatal accidents on our farms from *one* cause alone—carelessness in handling guns. Accidents with shot-guns occur every year, but when we study reports of them it becomes abundantly clear that they can be prevented, simply because they result from either sheer carelessness, failure to observe well-known rules of gun handling, or bad maintenance of the weapon.

Most accidental shootings occur through failure to observe the following simple rules: always handle a gun as though it were loaded, even when you know it is not; never point it at yourself or anyone else; be sure of your target before firing; remember that the safety catch, though a useful aid, does not guarantee that the gun cannot go off; and make sure your gun is not loaded when it is put away.

With the coming of tractors and self-propelled machines, there has been an increase in the dangerous practice of carrying a loaded gun in a place where the driver or passenger can grab it quickly and take a pot shot at a hare or a rabbit. All too often the gun goes off and kills someone.

Even more common is the fate of the man on foot who tries to force his way through a hedge, climb up or down a slippery bank, or clamber through a wire fence without taking the cartridges out of his gun. A sudden slip, a twig or a strand of wire catches the trigger—and there is another fatality to record.

C. S. MILES
United Dairies Ltd.

The Milk Marketing Board's new scheme for the payment of milk according to compositional and hygienic quality came into operation on 1st October. Mr. Miles here fills in the background against which the scheme is to be run

High Quality in Dairy Production

DURING the past twenty years or so there has been a decrease in the solids content of bulk milk. This is usually attributed to two factors—a breeding policy which has aimed at an increased yield without regard to quality, and the poor quality (and in some cases inadequate quantity) of winter feed.

Compositional quality

The production of milk with a high total solids content entails increased cost, and it is not suggested that this should be the aim without suitable financial reward. On the other hand, much of the milk sold off farms in certain months of the year during the last twenty years has contained even less than the legal presumptive minimum of 3 per cent fat and 8·5 per cent solids-not-fat, and these percentages are themselves below the national average.

Such milk must be regarded as sub-standard and, under the new Milk Marketing Board Scheme, will suffer a price reduction. But as a reward to those farmers who are producing milk above average composition, a bonus payment on the standard price will be paid. A scheme of this nature will do much to encourage the production of milk of better compositional quality and show the Food and Drugs Authorities, who have been very concerned at the gradual decrease in the S.N.F. content of milk particularly, that the producers are making a serious attempt to put matters right. At the same time it will help to gain the confidence of the consuming public and provide a sound backing for the National Dairy Council's campaign to promote the sale of milk.

When milk is used for manufacture the total solids content, or in the case of butter and cream the fat content, is of paramount importance because the yield of the product per gallon of milk used is directly related to these factors. With condensed and dried milk, the cost of manufacture is also enhanced because a larger volume of water has to be evaporated when the total solids content is low.

Milk samples undergo strict tests for compositional and hygienic quality

Hygienic quality

The hygienic quality of a consigment of milk is difficult to define. It includes the number of bacteria present, the keeping quality, the absence or otherwise of pathogens and of visible dirt. A standard which is acceptable will depend to some extent on the use to which the milk is to be put. For liquid consumption, milk must have an adequate keeping quality, be free from disease-producing organisms and from those causing taints.

Whilst efficient pasteurization will promote the keeping quality of milk and destroy those organisms likely to cause illness, it will not make a poorly produced milk into milk of satisfactory hygienic quality. It has been known for many years that the admixture of even a small quantity of unsatisfactory milk with a larger bulk of good hygienic quality will reduce the 'pasteurizability' of the whole very markedly. Taint-forming bacteria, too, will be destroyed by pasteurization, but if the taint has already appeared or is due to herbage or food ingested, it will not be eliminated.

When milk is to be used for the sterilized milk market, large numbers of spore-forming organisms are undesirable. The organisms themselves are destroyed in the process of sterilization, but the spores are not and may develop and spoil the product.

With milk intended for manufacture, the *type* of bacteria present is even more important than the total number. Some form of heat treatment is nearly always used, either as a part of or prior to the manufacturing process. But some bacteria survive and may multiply rapidly in the absence of competition from those already destroyed by the heating. If these are of a kind which produce spoilage and are present in considerable numbers, the quality of the product will suffer and sometimes total loss will result.

In the manufacture of cheese, the 'starter' must be active and uncontaminated—two factors which have a profound effect in the quality of the product. The now accepted practice of injecting cows with penicillin and other

In-place cleaning by chemical circulation is now established practice for most equipment. The picture shows plant being dismantled for a periodical inspection

antibiotics, mainly in the treatment of mastitis, affects milk secreted for forty-eight hours after the injection, and it must not therefore be sold off the farm. If such milk, even though mixed with a large volume from untreated cows, is used for the manufacture of cheese, the antibiotic present exerts a depressive effect on the starter organisms and a 'slow-working' poor quality cheese results.

A similar problem may arise through the presence of bacteriophage. This is not normally found in the raw supply but gains access usually in the cheese room or during the preparation of the starter. Its effect is to produce partial or even total inactivity of the starter organisms and the manufacture of a normal cheese becomes impossible.

Hygienic production and handling

The methods required for the production of milk of good hygienic quality have been studied since the establishment of the National Institute for Research in Dairying fifty years ago and are too well known to need repetition. In the early days the emphasis was more on the medical aspect of good hygiene, but with the virtual elimination of tuberculosis from our herds and the almost universal use of pasteurization or some other form of heat treatment, the commercial aspect, as it might be called, has assumed greater relative importance. Methods of production have also changed. Hand milking has been superseded almost completely by machine milking, and this in turn has brought new problems in the efficient cleaning and sterilization of farm equipment.

No raw material can be spoilt so easily and so quickly as milk. It follows that those on the distributive side of the industry and those engaged in the manufacture of dairy products have an equal part to play.

Indeed it is very much in his own interest for the dairyman to see that the milk is kept in good condition throughout all stages; otherwise a very large quantity of milk can easily become a complete loss.

As on the farm, efficient cleaning and sterilization of the equipment is one of the most important factors. It is also one of the most costly. Within the last few years manual cleaning has given way to 'in-place' cleaning by chemical circulation, and the same procedure can be used on many farm installations. 'In-place' cleaning is now established practice for most, if not yet all, dairy equipment and gives good results provided it is carried out under proper supervision and with careful attention to detail. Costs are reduced considerably as machines and pipe-lines need to be dismantled only at intervals for inspection purposes and not daily for cleaning, as was formerly the case.

Measurement of hygienic quality

It has been said that hygienic quality is difficult to define; it is also difficult to measure. Many tests have been suggested and several have been used and subsequently discarded. The standard of hygiene attained in the production or subsequent handling of milk is indicated by the number, the types and the activity of the organisms present, but the evaluation of these factors by normal bacteriological techniques is a long and expensive process requiring trained staff.

The dye reduction tests, i.e., Methylene Blue and Resazurin, are comparatively cheap and easy to perform and give the required answer in general terms quite quickly. The Resazurin test is to be used as the basis of the Milk Marketing Board's scheme for the control of hygienic quality, but it is quite possible that other tests for this purpose will be considered later on.

A note on the Milk Marketing Board's scheme for milk payment on a quality basis is on page 345

Calculating the Feed

THE weight of baled hay can be estimated from the average individual weight of a dozen or so representative bales. One ton of loose hay takes up 10–15 cu. yards, depending on whether it is young and leafy, long and coarse, or in a tall stack.

The density of silage varies with the difference in dry matter content; only by weighing several cu. feet of silage from two or three positions can an accurate figure be obtained. Calculations before the silo is opened can be based on 2–2½ cwt of dry matter per cu. yard, according to the depth of the silage and the degree of wilting.

The average weight of kale, turnips and mangolds can be estimated by weighing samples from several different areas of at least 4 sq. yards each. The more uneven the crop, the greater the number of measurements necessary. Roots in clamp can be taken as 33–35 lb per cu. foot.

J. R. STUBBS

shows how the

STOKE MANDEVILLE PROCESSING UNIT

can help you

Know Your Farm

As a start, let us take a quick look into our recent past history. Immediately before the war the era of technical development was revealing itself in many ways. Stapledon was demonstrating the value of grass as a high income crop. Plant breeders were producing varieties of crops well in advance of anything previously available to the commercial farmer. Machinery manufacturers were responding to the new demands of mechanization. Applied veterinary science was overcoming some of the ravages of diseases in livestock. Fertilizer manufacturers were making available more and better fertilizers, easy to store and handle. These developments were all 'on' economically.

Farming was therefore already on the threshold of great technical and practical changes; in fact, it was during this period that the fuses were being laid to the great composite technological explosion in which we are finding ourselves at the present time. Furthermore—and let this be realized—we are still only at the start of great changes, not at the end, and many modifications have yet to come.

It was the war that provided the essential detonation. The impact jolted us out of traditional torpor, and many new and valuable lessons were learned on a vast scale. At the end of the war we saw the brief period of the sellers' market where anything sold and the price was always high. This was a period that tended to lull the inexperienced into complacency, but those farmers who had seen the agricultural depression of the 1920s had no illusions about this period of false prosperity. And so, as was well forecast, the switch has been made from the sellers' to the buyers' market, where quality, presentation and price, together with the size of the human stomach, are the factors of major importance. He who produces what the market wants at the right price is the one who will inherit the market of tomorrow.

What is *your* cost level?

For many years the N.A.A.S. has recognized the supreme importance of each individual farmer knowing what is happening on his farm, not only in technical terms, but also in economic terms; and this is the basic thought behind the development of farm management advice.

At all costs one must avoid confusion between technical and economic perfection. Farm management helps to show what is economically right and what is economically wrong under the circumstances of the individual, and this is an absolutely essential development as we enter the era of competitive production.

Farm management objective

The aim is to provide an annual, confidential business service for commercial farmers and to follow up with the necessary technical advice, the prime object being to help the individual to raise his standard of living.

Farm management advice is provided by the N.A.A.S. throughout the country. A particularly interesting development in recent years has been the setting up of a processing unit at Stoke Mandeville, Bucks, to assist the individual District Advisory Officer. Often these officers were unable to deal with the number of cases necessary to make a substantial impact on the problems arising in the course of a working year. The unit relieves him of the necessity of waging an everlasting struggle with sets of farm accounts which have not been designed to give the essential data for farm management analysis.

Originally, the unit was established to provide assistance to advisers in Buckinghamshire and neighbouring counties. As greater experience has been gained, the services of the unit are now available in other parts of the country where the D.A.O.s have adopted a similar procedure for examining farm records. The farmer interested in this procedure should in the first instance contact his D.A.O. to find out whether the necessary records are available locally. If they are, the D.A.O. can provide them and explain the details of the scheme. In areas where this particular scheme is not at present in operation, the D.A.O. will be able to provide an alternative procedure designed for the same purpose of helping in the business management of the farm.

How the scheme works

Under the Stoke Mandeville Pilot Scheme it is the farmer's responsibility to provide the basic document, known as the Management Analysis 1 (M.A.1). This he usually does by instructing his accountant to present his farm records on the M.A.1 supplied to him by his District Advisory Officer. The M.A.1 is a true trading account which is so designed as to give the minimum of information necessary for farm management advisory work. Many wonder whether they will be able to match up to the task of keeping the necessary records to complete the M.A.1, and it is this fear that puts them off making a start. In order to remove this difficulty, a simple record book has now been devised and, it is hoped, will be available before long for those farmers wishing to use the Management Analysis Service.

The farmer sends the completed M.A.1 to the District Advisory Officer, who scrutinizes it for obvious errors, clears any special points of difficulty, and sends it to Stoke Mandeville, where the form is mechanically analysed. The

district adviser is thus relieved of calculation chores which, in the past, have been a serious handicap to the volume of work possible.

After analysis the district adviser receives the results on a second sheet, called the Management Analysis 2 (M.A.2). This is the basic *diagnosis* sheet and, in the broadest terms, it simply indicates whether the financial result of the farm as a whole is satisfactory or unsatisfactory, and then which *section* is satisfactory or unsatisfactory.

It is from this simplified diagnosis that the lead is given as to which part of the business needs attention and, therefore, where the scrutiny of the farmer and adviser should be directed.

Essential requirements

The first essential is that the individual farmer must recognize the need for such an annual service. It is most important that he should *know* the strengths and weaknesses of his enterprise. Time and time again management analysis reveals to him problems he never even suspected existed. In the competitive present and future each farmer must have the essential facts presented to him annually, and in a form readily understandable.

The second essential requirement is an accurate M.A.1, and if necessary the N.A.A.S. will give guidance on how to ensure it. If the M.A.1 is not accurate the diagnosis cannot be accurate.

It will be noticed by those who have studied the records required that only one additional record is necessary to those already kept for the annual trading account and the agricultural returns, and that is an *accurate split of feedingstuffs* between the various classes of livestock. In view of the great importance of feedingstuffs as an item of cost, such a record is of the utmost value. The misuse of food is frequently the cause of poor results.

Avoidance of complications

It will be noted that there are only two double sheets of paper used annually, the M.A.1 and the M.A.2. All the essential data can be found on these two documents, which have been refined to ensure complete understanding by both farmer and adviser.

Full instructions on the use of these sheets are usually given verbally at the start to those participating in the scheme. It is most important that this should be done, and experience has shown that small group meetings are the most valuable in this respect.

What the annual service shows

In broad terms the M.A.2 throws light on four very important sets of facts:

1. Finance.
2. Efficiency of land use (both grass and arable).
3. Efficiency of feed use.
4. Efficiency of other resources, i.e., labour, machinery and basic costs.

And so the strengths and weaknesses in any farm organization can be pinpointed.

D.A.O. — the key man

Clearly, farm management cannot be reduced to a series of figures from a number of records. *The interpretation of the records is by far the most important part of the exercise.* This is the key to success, and where the District Advisory Officer comes very much into his own, for in most cases he will know the

circumstances of the individual farm and farmer. His guiding remarks on the M.A.2 will be far more valuable and better understood by the farmer than any number of tables and complicated formulae which so often can confuse both the technical adviser and the farmer rather than clarify the true position on the farm.

District advisers, by the very volume of work they are handling in this field, are developing an expertise in interpretation second to none. Furthermore, in-service training organized by the N.A.A.S. to promote progressive development is ensuring that all District Advisory Officers are kept well abreast of current developments.

And so it can be seen that the D.A.O. is not on his own. He has the resources of the whole of the N.A.A.S. behind him, including specialists who have such an important role to play in applying the newest technical knowledge to the individual farm. And it doesn't stop there; he also has the guidance of University economists, who continue to feed him with the most recent information on economic developments.

What happens after diagnosis?

It will be seen that diagnosis of the overall position on the M.A.2 is only the start of the process of farm management advice. By removing most of the calculation work from the District Advisory Officer, he has far more time to think and deal with the application of the technical advice he gives based on the findings of the analysis. With coverage (i.e., the number of farmers in the scheme), the district adviser can recognize certain common problems in his district which can be dealt with on the basis of a mass advisory approach, frequently through farm demonstrations. The important difference of this approach is that it is mass advice, *but without losing sight of the individual farmer* who is in the full farm management scheme. On these occasions specific problems are demonstrated to a number of farmers who have a common problem, and our experience is that the interchange of ideas between these farmers is exceedingly important.

Where do we go from here?

The accuracy of the M.A.1 is the first important step. The second is accurate and rapid analysis. The third, interpretation by the District Advisory Officer. Discussion of results with the farmer is the time when ideas will be hammered out and the question posed—where do we go from here?

From the facts and figures available it is now usually possible to run a forecast budget embracing, and so testing, any suggestions put forward. It may be increasing the number of cattle; it may be cutting out the dairy herd entirely; it may be increasing the cereal acreage or increasing the fertilizer use on crops; it may be the building of a secondary enterprise of pigs and poultry; it may be a combination of these.

By using the farmer's own figures—that is, the results he is actually getting on his farm by using the M.A.1 and M.A.2—a budget can now be built up for the farmer with the assistance of the District Advisory Officer on another M.A.1 and processed at Stoke Mandeville to give a lead as to what the next year or years should hold for him, according to the changes suggested. This forecast service is a most important side of farm management development, and a most important function of the Stoke Mandeville Unit is to carry out the essential calculations accurately and quickly, for farmers within the areas at present served by the Unit.

My advice to farmer readers

Wherever you live, do not put off participation in farm management analysis with the help of your District Advisory Officer. It is far better to know the facts than be engulfed in perpetual uncertainty and niggling worries. The management service is strictly between you and your District Advisory Officer. Many of them are making use of the facilities available at Stoke Mandeville, but whatever the system used locally, the resulting advice will be equally valuable.

The success of farm management advice can be judged by one criterion only—its ability to help the individual farmer direct his capital, knowledge and experience into those channels which will help raise his standard of living to a maximum and at the same time to enjoy a degree of leisure comparable to that enjoyed by the rest of the community.

My advice is to discuss this matter with your District Advisory Officer as soon as possible and send in your first completed M.A.1 without delay.

J. R. Stubbs, N.D.A., is the County Advisory Officer in Buckinghamshire. He was formerly in Gloucestershire for 12 years, during which time he carried out observations on various work study projects, particularly dairy farming, cultivation, silage-making and haymaking.

Liver Fluke Forecast

SERIOUS trouble from liver fluke is not anticipated during the coming autumn and winter in England and Wales. The level of the disease is expected to be about the same or slightly higher than that of last year, except in north-west England, where prospects are rather better than in 1961.

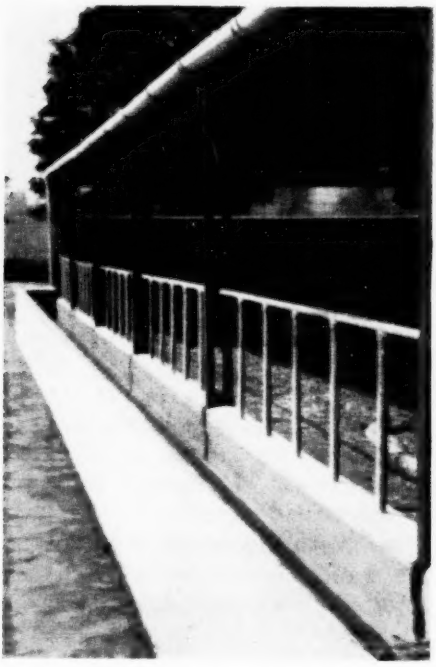
Compared with last year, moisture conditions this year have been slightly more favourable for the development of the fluke, but this has been offset by lower temperatures. Rain in many areas in August and September has produced conditions favourable for the development of the fluke. If wet weather continues, stock can be expected to acquire a little infection on those farms where liver fluke disease is known to be a problem.

Since the season is not likely to be entirely fluke-free, some control measures will be called for if the health of stock is to be fully secured. There will be no need to apply molluscicides to kill snails to reduce the infection on the herbage, but it will help if stock are removed from the worst fields during the latter part of October, November and December; also in January where alternative grazing is available.

Ewes which have not been dosed for fluke since lambing, particularly those in north-west England and North Wales, will benefit from treatment in October in order to kill flukes acquired after the final treatment last season. A second dose is advised in January or February where a late lambing season makes this possible, or better still after lambing if given under the guidance of a veterinary surgeon.

Cattle at risk in late autumn and winter will similarly benefit from a treatment in late winter.

On those farms in Wales where black disease is a problem, ewes should be vaccinated during autumn. This will prevent recurrence of the disease which may arise even under conditions of low fluke infection.



Feeding barrier with frequent uprights

N. B. WOOD

looks at the design of feed barriers and mangers and points to

Feeding without Waste

CONDIMENT manufacturers, it is said, make money out of what is left on the side of the plate. Be that as it may, it is certainly true that all that counts in feeding livestock is what ends up in the stomach. All that ends up anywhere else has lost money for the farmer.

The design of feed barriers and mangers for cattle should ensure fair shares for all, with nothing wasted. How does waste occur? There are two causes: waste by the animal during feeding and waste of time and energy in getting fodder to the animal.

Where conditions permit, this last cause is often eliminated by allowing the cattle to feed themselves, either on the growing crop or at the storage point. An alternative is to fill portable bunks or mangers at the storage or growing point and transport them to an accessible place for the cattle. This saves double handling. Another way of avoiding double manual handling is to use a trailer with a self-emptying floor which unloads along the feeding barrier or manger without hand labour. There are also developments in the use of mechanical conveyors and augers for taking fodder directly from store to cattle. Obviously within the scope of a short article it is not possible to describe or discuss the merits of the various fodder handling systems. It must confine itself to the avoidance of waste by cattle during feeding.

Undoubtedly the main cause of this waste is by cattle tossing heads into the air when stepping back from the feeding face with a mouthful of feed.

This is then either dropped whilst chewing or lost by tossing. The design of the feeding barrier or manger should therefore prevent tossing the head when stepping back.

Simple manger and barrier

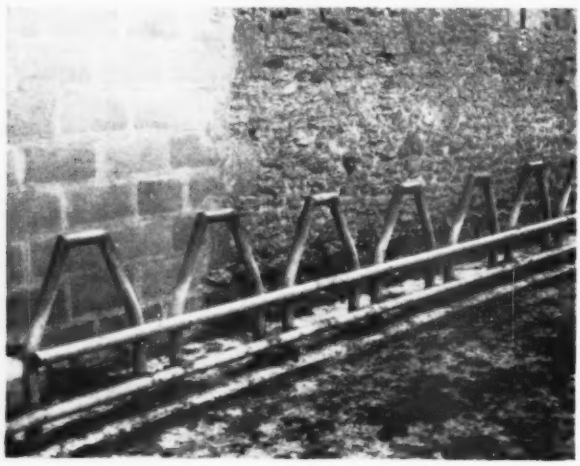
The simplest form of barrier is the electrified wire, as used to control field grazing or silage at the clamp. A development of this type of barrier is the electrified wire along a field track behind which carted fodder is placed. When fed in this way there is a likelihood of fodder being pushed out of reach, and so the next development is a row of blocks or railway sleepers about 3 feet back from the line of the wire.

The result is a simple manger and barrier, and this form has been used successfully single- or double-sided for silage feeding and zero grazing. In these cases the wire can be carried on stakes sunk into concrete in old soil drums. When not required this type of barrier can be dismantled and rolled away. Its disadvantage is the necessity for keeping the wire low, say 24 inches above yard level, which means an extra barrier at a higher level if used in confined areas.

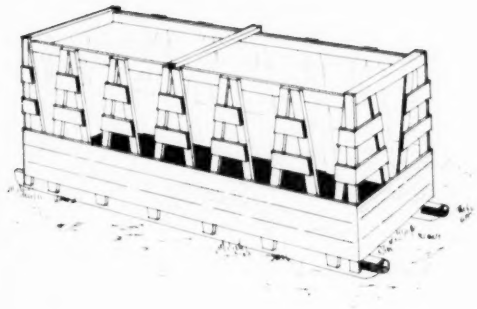
If a front is provided at floor level, then the barrier can be raised correspondingly. This front can be made from 9-inch concrete blocks in one or two courses, giving a height of 9 inches or 18 inches, or in railway sleepers giving a height of 10 inches or 20 inches—about the maximum height if cattle are to feed off the floor.

Of course, this system presupposes that all feeding is on concrete with no build-up of litter. The critical dimension is the height of the barrier wire or rail above the lip of the front. The most effective height is from 1 ft 9 in. to 2 ft 6 in., making the total height of the barrier 2 ft 6 in. to 4 ft above ground level. It is not generally necessary to provide anything more elaborate than this for feeding silage, kale or zero grazing.

Reference has been made to a back-board or sleeper about 3 feet from the manger front, and this dimension is about right whatever the type of manger or feed barrier. Where the cattle feed double-ranked facing each other, it is not necessary to provide a central division, provided the overall width does not exceed about 4 ft 6 in., as cattle can then reach the full width.



'A' type feeding barrier



Bunker with 'A' type feeding barrier

Where feeding is controlled by a low headrail, as previously described, there is no need for a lot of uprights (only sufficient) to support the rail. One successful feed barrier has been built with railway sleepers with upright posts only at the junction of the sleepers laid horizontally, i.e., 8 ft apart, which support the headrail. Up to five dairy cows feed between each pair of uprights.

Some will say that this is very close standing along a feeding face, but this tight packing also helps to prevent waste. With dehorned cattle, if one animal does pull back it finds difficulty in pushing in again. Experience has also shown that where space behind the cows at the barrier is restricted this also makes it difficult for cows to push in. So once at the manger, they stay there.

Frequent uprights

Besides the low headrail type there is the alternative arrangement with frequent uprights. In its simplest form this is a series of upright posts about 12 inches apart, extending about 3 ft 6 in. above floor level. Once the cow has put her head over and down between two posts, she cannot pull back easily. The next refinement is to join each alternate pair of posts at the top, thus giving a feeding place every 2 feet. A variation of this is to build concrete block piers 1 ft 6 in. wide, with a 12-inch gap between. This, of course, is elaborate, unless piers are kept to about two blocks high above a dwarf wall—again making an overall height of about 3 ft 6 in.

Inclined posts

Another development is to tilt the posts sideways, which again prevents the animal pulling straight back. These inclined posts are 10–12 inches apart. This form of feeding barrier lends itself particularly well to portable barriers at silage face or hay barn, also as the sides of bunkers which can be filled at the storage barn by a fore-end loader and carried into the yard. The next development or form of this front is what can best be described as the 'A' front. Again a feeding space is provided every 1 ft 8 in. to 2 ft.

None of the foregoing feeding barriers is 100 per cent fool-proof in all cases, but they do minimize waste.

Mesh type

Another type of manger has a mesh of welded rods placed on top of the fodder, through which the cattle pull upwards. This type prevents large quantities being taken at one time and, with a properly designed head-rail, wastage is almost entirely eliminated. The mesh frames come up on hinges, thus preventing access to the fodder until dropped down.

The barriers and mangers described give no control over quantity eaten by individual animals who have free choice of position. Where controlled

feeding is required, some form of tie is necessary. This is generally provided by yokes controlled in banks. The centres of the feeding places are then about 2 ft 3 in. to 2 ft 6 in. apart. To ensure that each animal puts its head well into the manger to feed, thus facilitating tying, it is essential to have a fairly wide lip to the manger.

There is a wide choice open to the cattle feeder, depending on how far he wishes to go. Cattle pulling at a hayrick in the field is no longer acceptable, although it did have the virtue that wasted hay provided a good bed on a winter's night and did not block the yard drain.

Norman B. Wood, A.R.I.C.S., is a Land Commissioner (Farm Buildings) in the Agricultural Land Service, Bristol.

How Deep should we Plough?

asks ***J. E. WHYBREW****, who has been looking into this controversial question on the clay soils of Cambridgeshire*

For two hundred years the protagonists of deep and shallow ploughing have argued this question. As recently as 1945 and 1951, Dr. E. W. Russell carried out nearly fifty experiments on ploughing depths, covering a wide range of soil types and climatic conditions throughout the country, in regions where deep ploughing was practically a sacred practice and in other areas where it was uncommon.

On nearly half the sites he found little or no advantage from deep or very deep ploughing. Moreover, it was impossible to pinpoint the factors responsible. His results make one wonder if we are getting all that we hope for from deep cultivations. Is an enthusiasm for deep ploughing justified?

Experiments on ploughing depths were started in 1952 at four of the Ministry of Agriculture's Experimental Husbandry Farms. They included Boxworth, where the soil is a well-drained chalky boulder clay with a clay fraction of about 40 per cent.

Three depths tested at Boxworth

Three ploughing depths were tested— 'shallow' ploughing at 4 inches with general-purpose bodies; 'deep' at 9 inches with general-purpose as well as digger bodies; and 'very deep' with digger bodies at 15 inches for roots and 9 inches for cereals. An additional treatment replaced the plough by a cultivator.

The rotation was potatoes, winter wheat, sugar beet, barley, and all the crops were grown each year. On the average of eight years' results, deep ploughing raised the yield of ware potatoes by 6 cwt compared with shallow ploughing, but very deep ploughing gave no further increase. On the other hand, no ploughing at all reduced yields by 12 cwt below that of shallow ploughing.

Winter wheat following the potatoes gave no response to deep ploughing, and cultivating after potatoes gave yields comparable to those got by ploughing. This was not unexpected, since it is frequently practised.

Sugar beet was the only crop to give higher yields from very deep ploughing. Yields from continuous shallow ploughing averaged 14·7 tons of washed beet per acre; deep ploughing increased this to 15·7 tons and very deep ploughing every other year raised the yield to 16 tons. Cultivating each year, as opposed to shallow ploughing, reduced yields to 14·1 tons per acre. Under very bad soil conditions, such as occurred in the spring of 1957 following the mild wet winter, seedbeds after cultivating or shallow ploughing were very poor and it was impossible to get a full plant of beet. Yields suffered accordingly; no ploughing yielded only 60 per cent, and shallow ploughing 87 per cent of the deep ploughing. Tilths after deep or very deep ploughing were excellent in that year, and very deep ploughing gave an extra ton of beet (a 14 per cent increase) over deep ploughing. Ploughing depths had no effect on sugar content.

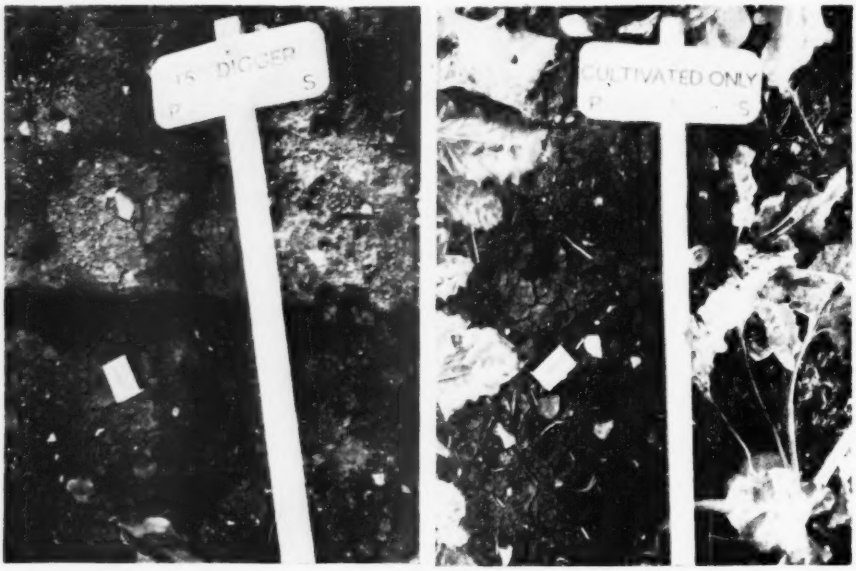
Barley followed the sugar beet and gave no response to greater ploughing depths, and yields were 6 per cent lower where the land was not ploughed.

Digger or general-purpose ploughs?

Many farmers, especially on heavy land, prefer digger plough bodies because the broken furrow slice which is left is said to make for easier seedbed cultivations. A comparison between general-purpose and digger plough bodies was included in the trial. Both types were used at a depth of 9 inches. Only slight differences in crop yields were recorded, but these were nearly all in favour of the general-purpose body. Contrary to expectation, the need for different cultivations for the various ploughing depths was very small. After autumn ploughing, weathering during the winter was sufficient to allow all the different ploughing depths to be worked down for spring-sown crops with the same cultivations. The only time when extra cultivations were required was after ploughing for winter wheat following potatoes. Then it was sometimes necessary to increase the number of cultivations after ploughing with digger bodies, irrespective of the depth of ploughing for the previous crop, so as to break down the furrow slice in time for the autumn drilling.

Fertilizer placement

Phosphate and potash for the sugar beet crop were applied in the autumn before ploughing or in the spring on the seedbed, to see if ploughing fertilizers



Severe cracking in a dry summer on chalky boulder clay soil, following ploughing at 15 inches for sugar beet (left), *compared with no ploughing* (right)

down would have any adverse effect on yields. Surprisingly enough, the yield of beet was not affected, even when the phosphate and potash had been ploughed down 15 inches. In some seasons the young beet plants were slower to come to the hoe where the P and K had been ploughed in, but they soon made up this leeway. The application of phosphate and potash to stubbles in the autumn is one way of easing the labour load in the spring, and it also helps to avoid wheel damage to sugar beet seedbeds.

Similarly, for potatoes, fertilizer applied over or in the ridges was compared with broadcasting on the flat to study the effect of placing high levels of compound fertilizer (equivalent to 12 cwt per acre of 10: 10: 15 compound) close to the seed. Once again, the yields were not affected by the method of application and no signs of scorch were seen on the potatoes which received their fertilizer in or over the ridges.

No residual effects were noticed in the succeeding cereal crops from the different methods of fertilizer applications, for beet or potatoes.

Seasonal effects

Careful observations can explain and reinforce experimental results expressed in terms of yield per acre, especially when yearly differences are small and, of necessity, subject to high experimental errors through lack of replication. The mild wet winter of 1956–57 has already been mentioned and it is worth recalling that 1957 was one year in which digger bodies gave better results than general-purpose bodies when used for potatoes and sugar beet.

Where no ploughing had been done, the seedbeds contained more weeds than any others. This was not important with cereals, since spraying against weeds was routine, but it increased the sugar beet costs because of the extra hand work needed. In the dry summer of 1959 the very deep ploughed land under sugar beet showed many large cracks indeed. In comparison, there were

only moderate cracks where ploughing had been shallow or where there had been no ploughing at all. In 1957 the winter wheat crop following potatoes was attacked by wheat bulb fly, and the attack was much less severe where the potato land had been cultivated. This, presumably, was a reflection of seedbed consolidation.

The comparison of ploughing depths ceased after 1959. Since then the trial area has been ploughed at a uniform depth of 9 inches with general-purpose bodies and cropped with barley, then potatoes, and (in 1962) winter wheat. During ploughing for barley in 1959, some plots were more difficult to plough than others. The difference was enough for stop-watch times to be taken. These showed that ploughing speeds were progressively reduced as the treatment ploughing depths became deeper: from 2·0 m.p.h. where the land had not been ploughed for eight years to 1·7 m.p.h. where the land had been ploughed very deep in alternate years. This observation was made in November, and subsequent yields were about 2 cwt lower where digger bodies had been used in the past, irrespective of ploughing depth.

The winter wheat crop showed wheat bulb fly damage this spring and, as in 1957, the attack was severest on those areas which had been ploughed very deep during the course of the trial. In both years there may have been tilth effects not discernible to the eye but which led to different intensities of egg laying in the preceding potato crop.

Extra cost not justified

It seems that at Boxworth the plough is still the most efficient implement for initial seedbed preparation. Increasing the autumn ploughing depth from 4 inches to 9 inches gives good results in the form of increased yields of potatoes and sugar beet and of barley in difficult springs. But very deep ploughing does not give increases in yields which can be justified by the extra cost. Indeed, if raw subsoil is brought to the surface by deep ploughing of clay soils, the land may become more difficult to work and yields may be reduced.

J. E. Whybrew, M.A. (Cantab.), has been on the Ministry's technical staff at Boxworth Experimental Husbandry Farm since 1956.

F. P. ROWE, *of the Ministry's Infestation Control Laboratory, advises on the strategy needed to control*

Rats and Mice in Corn Ricks

NOTWITHSTANDING the growth of combine harvesting, it seems likely that some building of corn ricks will continue, particularly on small farms; and ricks are notoriously vulnerable to infestation by rats and house mice.

These rodents eat considerable quantities of grain—a rat about 6 oz per week and a mouse 1 oz. And that is not all; by their wasteful feeding habits much of the rest is made unsuitable for milling. The contamination of grain from ricks by rodent droppings and hairs is also a matter of concern to processors of cereal foods. Because of their similar size and shape to grain, mouse droppings in particular are extremely difficult to remove, and heavily contaminated grain may in consequence be rejected by the miller.

Various methods, including staddles, barriers, repellents and fumigation have been tried to reduce rat and mouse damage to ricks, but none of these methods has proved entirely effective or economical. During the last war investigations were made by the Bureau of Animal Population into the use of poisonous baits—zinc phosphide, arsenic and red squill. Although treatments with zinc phosphide gave encouraging results, it was not found possible to overcome the danger from poison residues in the threshed grain and straw.

Nowadays, by careful use of one of the blood anti-coagulant poisons such as warfarin, a good control over rats and mice in ricks is possible. The poisoning techniques required to deal with rats and mice are different, and are therefore described separately.

First, rats

The rate of colonization of ricks by rats varies widely in different localities and from year to year, depending very largely on their population, the food supply available to them and the choice of rick site. In general, however, rats are usually established in ricks by the end of the year. Others live in nearby buildings and in burrows in hedgerows and banks. Such infestations should always be included in any poison treatment of ricks. There is evidence too that rats living as far as $\frac{3}{4}$ mile from ricks may visit them to feed, and it is wise therefore to extend rat control measures to the whole farm.

A successful control of rats infesting ricks has been obtained in field trials by adopting the following procedure. The ricks were inspected regularly at monthly intervals, to detect infestation at an early stage. Rat holes found at the base and in the sides and thatch of the ricks were treated with bait containing 0·005 per cent warfarin. The amount of bait placed in each hole was varied according to the size of the hole, the minimum being about 2 oz and the maximum 8 oz. It was possible to place the poison bait well out of reach of domestic animals and farm stock.

After each hole had been baited, the entrance to it was lightly covered with straw, so that new and re-opened holes were easily detected at the next inspection. It wasn't necessary to bait any rick on more than three occasions, and the average amount of bait required per rick was 15 lb. Hedgerows, manure heaps, a piggery and the banks of a stream—all within about 100 yards of the ricks—were examined after each rick inspection and any rat holes found in them were also baited with poison.

Much less satisfactory results can be expected if ricks are inspected irregularly and if rat-holes in the thatch—which normally require the use of a ladder—are ignored.

Continual invasion by mice

The movements of house-mice living in the fields are largely influenced by farming practice. On farms where corn is cut and stooked, part at any rate of the field populations shelter first beneath the sheaves and later in the stooks. When the corn is carted for rick building some mice may be carried within the sheaves, and a small number entering in this manner is sufficient to build up into a population of some hundreds in the course of 6–9 months.

Other mice remain in the stubble where there is ample food and cover, or move into the hedgerows. A recent study on arable land in Hampshire has shown that there is a continuous invasion of ricks by house-mice from nearby fields and hedgerows. Traps placed to intercept all mice entering four ricks, caught 364 in 9 months, the majority between September and November. The smaller numbers caught in later months indicated that field populations of mice are then low and that little further invasion of ricks occurs. Rick mice do, however, breed rapidly during the winter months, and at threshing time large numbers are turned out again into the fields and hedgerows.

In view of this early continual invasion of ricks by mice, it is not surprising that the rick-baiting method described for rats kills only a small proportion of any mice that may be present, for it is often unnecessary to bait a rick against rats until after the mouse population in it has become well established. Also, it is well known in rodent control work that poison baits for mice need to be much more closely spaced than for rats. Recent experimental work has therefore been concentrated on preventing the initial growth of rick populations of mice by placing numerous permanent warfarin baits in the ricks, either as these are being built or as soon as possible afterwards.

Two trials—and the result

Two baiting methods have been tried with equal success. In the first, containers holding $\frac{1}{4}$ lb of 0·025 per cent warfarin in oatmeal bait were placed inside ricks one week after they had been built. The containers used were stout cardboard and metal cylinders 9 in. × 3 in. and blocked at one end; agricultural land-drain tiles would be quite suitable. They were placed 1 ft

inside the ricks with the open end facing outwards, at intervals of 5 ft and in two rows, one just below the eaves and the other halfway between the eaves and the base of each rick.

In a second trial, 3–4 oz warfarin baits wrapped in paper were placed in the ricks—a method first practised by J. Cuthbert of the Department of Agriculture for Scotland. The baits were put in the same position as above and pushed into the newly-built ricks to a depth of about 1 ft. The following table compares the numbers of live mice recovered from ricks baited permanently around the base only (A), around the base and internally using metal or cardboard containers (B), in rat holes in ricks (C), and in rat holes and internally with paper baits (D). It shows clearly that fewer mice were found in ricks baited internally and that the grain was also much less contaminated by mouse droppings than grain from untreated ricks.

Baiting method	Number of ricks	Average time of standing (*weeks*)	Total number of live mice at threshing	Average number of live mice/rick	Average number of droppings per 1 lb grain
(A) Around the base only	11	36	752	68·4	4·90
(B) Around the base and internally (cylinders)	12	34	126	10·5	0·63
(C) In rat holes only	7	34	348	49·7	7·76
(D) In rat holes and internally (paper)	6	33	50	8·3	0·79

Early action

Both baiting techniques are equally easy to use when ricks are being built, but whereas it is a relatively simple operation to thrust paper baits into the sides of completed ricks, the same operation using containers is more difficult and time consuming, even in ricks erected only one week previously. It must be emphasized that the success of either method is dependent on treating newly-built ricks as quickly as possible.

At threshing time all uneaten rat and mouse baits should be recovered as far as practicable and disposed of by burning or deep burial. If this is done and the quantities of bait and methods of application recommended above are used, poison residues in the grain and straw will be negligible.

JOHN TOD

An approach to

POT PLANT GROWING

THE great thing about flowering pot plants is that they're *heavy*. A grower in Kenya is going to think twice before he decides to grow cyclamen in 5-inch clay pots for Covent Garden, whereas carnations, freesias or other lightweight glasshouse produce may be grown in bulk and transported over what used to be considered impossible distances. Another advantage is that pot plants may be grown and sold all the year round. From the buyer's point of view the flowering plant may be had in great variety and, because it is a living and growing thing, it provides a special interest over a long period.

My experience with pot plants is that they mix very well with our other glasshouse crops such as tomatoes, lettuce and chrysanthemums. In our gardens here we have several smaller houses which are not convenient for cut-flower beds and yet will grow good pot plants. We also have an east-west house 140 ft × 20 ft which, for many crops, often gets too hot in June. But with sufficient shade to check the glare of the sun beating on the southern slope of the roof, it will grow very good gloxinias with a minimum of fuel. We are not specialist pot plant growers, but we have formed a few opinions about the right approach to the job which may be of interest to younger growers.

Sound business methods

To make a living out of growing pot plants, you must sell at a profit. It is not enough to produce perfect plants. Remember the saying that in Holland the growers are business men who just happen to be growers, whereas over here the grower is sometimes not a business man at all. It is not surprising, therefore, that his trading account is disappointing, even though his plants may be first class. Against this there is no future in aiming at the quick profit to the exclusion of all other considerations. It is important to establish goodwill with those who buy the plants. What is the use of making a profit if the human relationships on the holding make life a strain? Life and living are more important than the 'quick dollar', and that leads me to the four things needed to be an 'operator', as they call glasshouse growers in America—life, man, equipment and customers.

Life, being a gift, should be treated with reverence. Although we can work with nature by persuading our pot chrysanthemums that the long winter nights have drawn in, as we pull the polythene shading over them, it is easy to become arrogant and ruin a crop with a badly cleaned bucket that had had

John Tod in one of his plant houses, built on the 'do it yourself' principle. In one section Mum cuttings are rooting under mist and controlled day-length conditions. The rest of the house contains 4,000 cyclamen in 5 inch pots.

nettle-killer hormone in it. The same applies with temperatures; a determination to have a batch of plants ready by December 20th may lead to 'turning up the wick' and so ruining the plants' constitution.

Honesty and courage

The qualities a man most needs as a grower and which must be struggled for are honesty and courage. A good grower aims at perfection, but he is always ready to admit responsibility for a bad plant or a mistake. He must be severely self-critical. If the boss starts late and finishes early, how can he expect his helpers to keep good time? In grading produce for market, he must keep to a true standard. To pretend to oneself or a customer that a plant is better than it is, is the slippery slope to the notice board (if you're lucky) 'Valuable Building Land for Sale'.

But if you are honestly satisfied the stuff is first-class, then stick your name on it in a determined fashion—a trade mark is an asset to be boosted with every good pack that leaves the houses, but one that is so easily damaged by a weary plant in the hands of a critical buyer. Mark only the best, but then mark it so that everyone knows who has grown it. The need for courage is obvious with every second visitor moaning about the Common Market and rising wages, not to mention the weather. You've just got to be determined, and the growers I know who are going ahead use ingenuity and are great hands at improvization. The courageous grower sees what the others are doing and aims at doing it better himself; he's not scared of new ideas and he makes the most of his opportunities.

Right equipment

Equipment today is increasingly interesting. We need houses, light, heat and water, and soon we may be using carbon dioxide too! Pot plants are one of the few crops that can be grown in old houses, but a house that can be well ventilated with level staging, concrete paths and good access is a help. You can grow pot plants well in an old house and save up the proceeds to buy a modern house, whereas the major glasshouse crops all seem to need a modern house from the start.

Light intensity and quality is most important, not only for energy to grow the plants, but for controlling the day-length to time certain plants for certain markets. We use fluorescent lighting for African violets and gloxinias in the seedling stages during the winter, and tungsten lamps for delaying budding on pot chrysanthemums. Dense, black polythene is used for inducing bud initiation on such plants as Kalanchoes. Lights controlled by time switches will bring petunias and such things as asters into flower much earlier, and there is still tremendous scope for development in this direction.

As regards heating, I can only say that it should be accurate and efficient. And it is so much the better if you can install it yourself. If you have been responsible for every joint and every control of your heating system, you know what to do at 2.30 a.m. on a frosty night when the alarm buzzer goes in your bedroom because steam pressure is dropping and something must be done—*at once*. We use low-pressure steam because it is flexible, cheap to install, useful for sterilizing, accurate as each house helps itself to steam through a motorized valve, and because we have heated all our houses with steam for over twenty years and so are used to it.

Right watering

The watering of pot plants is as important as anything. More plants are killed with kindness after sale by some over-anxious housewife who almost waters them with her tears in an endeavour to do right, but often only succeeds in drowning the roots! Wet feet are a menace, and overwatering surely results in sick plants. Only water when the plant is getting thirsty and then give it a good drink.

We use ½-inch smooth, black hoses from Italy, each having a brass end with the same thread so that our hose-ends can be used in any house. These hose-ends consist of a gas-tap brazed to a ferrule which will take roses as well as aluminium extension tubes. We have a varied selection of them for watering wide or narrow benches, shelves and below benches. For a mixed glasshouse grower, the different forms of automatic watering are quite an undertaking. He needs to get unmixed first.

Mobile glasshouse. Temporary staging holds Kalanchoes and pot chrysanthemums. Black polythene is used to shade the plants so that they are exposed to only short periods of daylight

The capillary attraction system needs a very strong bench to sustain the weight of wet sand. I like the idea of the rectangular tube to the top of which nipples are threaded, each nipple holding a plastic pot into which the actual clay pot is dropped. No staging or benching is needed. Water and liquid feeds are flooded into the plastic pots for a few minutes and then drained away again. The minimum of water is required so that there is no great weight and the maximum light passes through to plants at a lower level.

Another hopeful system for slow-growing plants is the watering head at a height of 18 inches or so above the bench, with each head supplying a charge of water through individual tubes (windscreen washer tubing) held by a hair-pin to the pot.

We must hit the happy medium between the wasteful watering-can held by a man who keeps an eye on the plants all the time and the over-fully-automatic system where the grower-technician looks into the house once a fortnight—perhaps to find that mice have built a nest in the control gear and all the plants are wilted!

Right service

The last link in the four mainstays of the business is the customer. The right sort of customer is looking for reliability and quality, which together equal service. If we can't offer a service then he will just go elsewhere—maybe 500 miles elsewhere. Although a variety of plants is a help to satisfy the local buyers, some pot plant nurseries grow very limited ranges; one in Canada grows nothing but red gloxinias yet makes it pay on a large scale.

You must have the right plants ready at the right time and in the right condition. No one seems to want bowls of hyacinths after New Year's Day, nor red pot chrysanthemums at Easter. Also, it is foolish to offer African violets to be put in freezing homes in February, when we know they enjoy May and June temperatures.

Start as you mean to go on

If you are lucky enough to be just starting as a grower, start as you mean to go on and ask for cash on delivery. Doing business is a matter of establishing a pattern, and if you put forward the pattern of no discounts and no accounts, there is no reason why it shouldn't be accepted by the person who wants your plants. To accept the idea of monthly statements and 5 per cent settlement discounts when you have something that someone wants to buy is mere timidity. Decide on your terms of business and stick to them. Most buyers are used to paying promptly in our business because of their dealings with the markets, and this tendency should be encouraged. This doesn't mean that your customers have to carry great wads of notes about with them. Have good, clear invoices showing your trade mark and terms, and file the copies so that you can sort out how much each line is bringing in, and when.

John R. Tod started market gardening, in partnership with his father, in 1938 on a 5-acre smallholding. His business now has a 5½-acre field of its own, including ¾ acre of glasshouses and ¼ acre of frames. The present cropping is ⅓ early tomatoes, ⅓ timed crops of cut chrysanthemums and ⅓ pot plants. Manchester market is only 20 miles away, and most of the produce is disposed of locally.

F. A. Secrett

Charles E. Hudson

MR. F. A. SECRETT, C.B.E., V.M.H., is known throughout the country as a leader in the horticultural industry, not only in the growing and management of crops, but for his personal interest in the training of young men.

He was apprenticed on Mr. A. J. Robbin's farm at Ealing. Subsequently, in 1908, with a loan of £1,000 from his father, he started on his own account on 20 acres of land adjoining Kew Gardens—difficult land with no water. In 1914 he repaid the borrowed money and in the same year married Miriam Grace Parker. The following year saw the acquisition of Mr. Alfred Poupart's stock-in-trade and crops at Marsh Farm, Twickenham, and in 1923 a further 75 acres of land at Horsham, where he developed many of the Engleheart stocks of narcissus.

In due course he left Marsh Farm and the land at Kew, and the well-known Holly Lodge and Crown Farms were taken over from Mr. John Poupart at Walton-on-Thames. This land was, in turn, vacated in 1937, when it was bought by the Metropolitan Water Board.

Secrett's present (Hurst) farm at Milford, Godalming, was the next purchase, and the land laid out with concrete roads and equipped for irrigation. A recent development has been the erection of a hostel for student-workers, which was officially opened by Lord Waldegrave in July last year.

Two other farms have been bought—one at an altitude of 500 feet at Elmstead, Kent, for dessert apples and pears (now under the management of his third son, G. A. Secrett) and one in Cornwall (now in the hands of the eldest son, F. B. Secrett) for the growing of daffodils.

Great influence

Secrett has always keenly supported horticultural research and experimentation, and has been ever willing to give unstintingly of his knowledge and experience to anyone he thought might benefit. Indeed not a little research has also been stimulated at his suggestion.

During the 1939–45 war, he was on many committees connected with food production. He acted as Honorary Adviser to the Minister of Agriculture on vegetable production—and toured the country stimulating production, thereby lessening the likelihood of the rationing of vegetables. His services were recognized by Her Majesty, in 1947, when he was made a Commander of the British Empire.

An active member of the Royal Horticultural Society for many years, Secrett has been on various committees and also on its Council. He was one of those who stimulated the industry to put up exhibits of first-class horticultural produce, subsequently such an outstanding feature at the Chelsea Royal Show and of the R.H.S. Show at Vincent Square.

He also found time to bring his unique experience to bear on the National Farmer's Union and on many committees of the Ministry of Agriculture. He was Chairman of the Vegetables Group, which is responsible for the Ministry's bulletins on vegetable production. His fund of practical experience and common sense helped to give these widely-used books a prestige and value they might not otherwise have had, and he was able to weigh in the balance the different ideas and methods from all parts of the country.

After all, most of horticulture practice until very recent times has been the skills and tradition passed by craftsmen from generation to generation. The journeymen gardeners went from one good garden to another collecting experience, knowledge and ideas, all which they gave. Much more could be done in the pooling of knowledge and experience for the benefit of the whole industry.

Keen mind

A visit to Secrett's farm always holds the surprise of some new or unusual crop being grown, and about which information is always readily forthcoming. His ability to pick out a plant variation of value, or to select a new strain from a mixed stock, has been demostrated over and over again.

When he imported 4,000 lights from Holland, Secrett was the first to introduce into this country this type of protected cultivation. In 1921 he was again pioneering the overhead irrigation of vegetables, as well as being one of the first to attempt the foliar feeding of crops through irrigation. No possible detail was omitted from his growing technique which he thought might lead to good quality produce and regularity of marketing. Thus irrigation water was warmed—a technique which is not as important as he thought at the time. In dry periods lettuce crops received rich dressings of organic nitrogen, since it can be argued that plants suffer from lack of nitrogen when there is lack of water. Against much theory, the system worked. Only part of the crop was treated with nitrogen, because if rain comes soon after the top dressing, too much nitrogen is apt to cause poor quality lettuce heads—a condition known as 'greasy nose'. Thus, whatever the weather, at least half the crop was likely to be first-class!

Secrett has made outstanding contributions to the cultivation of many crops but, in particular, the following may be mentioned: lettuces in frames and outside, mint (and its nomenclature), seakale, globe artichokes, narcissus flowers and bulbs for market, early carrots and radishes.

Interest in students

In the training of students, Secrett has shown his recognition of the need, in new techniques, for the alert type of student attitude, which has not only benefited that particular business, but has continued to provide new leaders, advisers and teachers for the industry. Customarily, Secrett gives a personal talk to his students at least once a week, and this, apart from other advantages, enables him to get to know every student individually. Some ten years ago, the students formed a club which meets at least twice a year, and one of those meetings always takes place at Hurst Farm. There are about 150 active members, which demonstrates a wonderful bond of loyalty.

As one would expect, Secrett's farms, besides growing crops well, were noted for reliable packing and grading long before the time when the importance of such things was realized nationally by the industry. Many of the machines used in the packing shed have been evolved by trial. The arrangement of the sheds and distribution of labour were carefully worked out beforehand; work study and new lines were subjects of common discussion. All his life absolute reliability and standardization of produce and packing have been the hallmark of his marketing, so that the mark of F. A. Secrett has been known by salesmen all over the country as completely dependable.

In the Secrett tradition

The sons are carrying on their father's tradition, and are now extending the sphere of production to a greater percentage of crops grown in glasshouses and bulbs grown in temperature-controlled stores. 'F. A.' admits to being pleasantly surprised at the results!

Secrett is, of course, a successful business man, with an instinct of when to take a risk. He is also a friend to anyone who really wants help, and a leader to whom the industry owes much.

Mr. Charles Hudson, C.B.E., V.M.H., N.D.H., was, until he retired last November, the Ministry's Senior Advisory Officer on Horticulture. He is a Governor of the Glasshouse Crops Research Institute, Chairman of the Horticultural Committee City and Guilds of London Institute, and is a member of the Council of the National Institute of Agricultural Botany.

G. H. Stansfield

From Farm to Supermarket

Part I

PREPACKING, which might be thought of as the life-blood of the supermarket, first really got under way in this country about ten years ago, concurrently with the opening of the first supermarkets. It has continued to grow at a slow but ever-increasing rate as more and more self-service retail outlets have come into being. The popularity and comparatively quick growth of supermarkets have been due to a number of factors. Among the most notable have been the scarcity of suitable labour for staffing counter-service type establishments, the moving-in of big business interests into the food-selling industry, and the fact that many women now go out to work besides running a home.

The manufacture of clear plastic films such as polyethylene was a further contributory factor. If the customer is expected to serve herself, it is essential that she should be able to see the nature and quality of the contents. Following the strong initial demand for the new products, the manufacturers of materials and machinery for prepacking have done a great deal to promote this form of merchandizing.

Types of pack and materials

Fundamentally, three types of pack are used for prepacking fresh produce—the bag, direct overwrap, and cartons which may also be wrapped in film. The design of these three types has not altered basically over the years, but many new materials have been introduced. The type of pack depends upon the quantity of the product to be put up in units, its shape, perishability, how fragile it is, the distance from packhouse to supermarket and the type of outer container.

Sheet polyethylene film, the cheapest and most usual type of pack, is the customary material used for the bags. It is suitable for many different commodities, especially those which don't need protection or those which have a low rate of respiration. Cellulose acetate and regenerated cellulose film is also used.

A recent modification of the bag pack is seen in the use of polyethylene netting supplied in tubular form. This is cut into lengths and the bags formed by sealing each end. Cotton net, both in bag and tubular form, is also used, but it lacks the heat-sealing property of polyethylene, and clips are used to make the seals.

Cartons are invariably reserved for the more expensive items and those which need physical protection. They are of various types and, if lidded, may be provided with a window. Open-topped cartons are often wrapped with film after filling.

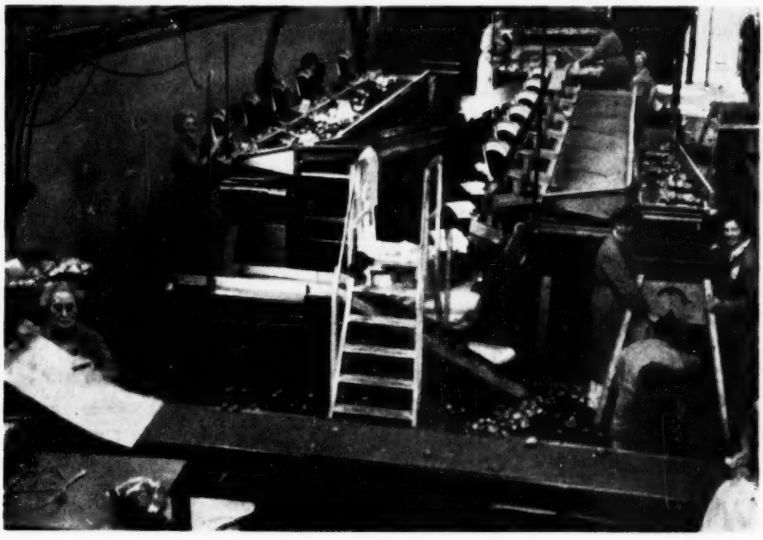
Some products are packed in a carton which is reduced to the dimensions of a tray for greater visibility and less use of material. Direct overwrapping in a single sheet of film is used for foods which do not need much protection and which can be utilized collectively, or for single, bulky items.

The latest innovation for overwrapping and tray wrapping is a new type of film which is heat shrinkable. The overwrap is made in the normal manner and then the completed pack is passed through a heat tunnel. The heat shrinks the film around the contents to give a tight pack.

Mechanization

Most of the mechanization has been in setting up prepack plants for potatoes. This crop is naturally suitable for passing over machinery which will automatically clean and bag it. Bagging machines are semi-automatic or fully automatic in that they weigh out a given quantity of produce which can be tipped manually into a bag or automatically fill the bag. The bagging

Potato pre-packing plant



An apple pre-packing line. Graded fruit, circulating on flow-return tables, is packed into cardboard forms and placed on the top conveyor. The pre-packs are sleeve wrapped on two semi-automatic overwrappers at the end of the line

machines are fed from hoppers or from contra-revolving, flow-and-return, belt systems.

Grading tables, in the form of conveyors, are placed between the cleaning section (washing or dry brushing) and the bagging units. If the potatoes are washed some form of drying unit, either by sponge rollers or hot air, is incorporated in the prepack line.

At least a week's supply of tubers is now stored in most packhouses, and water flume systems carry the potatoes from store to packing line. The resultant packs are placed in two-ply brown paper outer containers which hold 50 lb of produce and are stacked, usually on pallets, for dispatch.

Packhouses nowadays look like factories, and factory methods are used to get the high degree of efficiency necessary in turning out large quantities of a uniform product.

The highest degree of mechanization has been possible in those packhouses which are dealing with a specific crop or crops, where it is worth while to set up production lines to work all the year round or, at least, for an extended season. Therefore those packhouses for such crops as potatoes, apples, carrots, tomatoes, etc., have become the most specialized and highly mechanized.

Overwrapping machinery of the fully automatic or semi-automatic type which has long been in use for other food products, has been adapted for the overwrapping of cartons of horticultural produce. Such equipment is expensive, and a high rate of output must be achieved if the capital cost is to be justified.

Brand names

There is another aspect, too, to this prepacking business. For the first time the growers' name is going right into the kitchen. Formerly, many bulk packs bore the name of the packer, but except in the case of apple wraps carried home by the consumer, the grower's name was unknown beyond the retail stage.

Brand names on packs have been double-edged in their effectiveness. Good packers have achieved a measure of publicity by recommendation of their produce, but any complaints now come back straight to the farm. It is a notable fact that if a brand name is on the produce the consumer does not complain about poor quality to the retailer; she writes direct to the packer.

Some of the supermarket chains are not unaware of the great publicity value of brands and insist that packers use the firm's own labelled bags for any produce packed for them.

The liability of the packer for produce packed under his name has led to date marking packs on the day they pass through the packhouse. Perforated coding machines or different colour-coded ties are used to identify consignments and act as a check on the retailer to ensure that he has adequate stock control and turnover according to date.

The economic aspect

The economics of this new form of presentation of horticultural produce depend upon the redistribution of the margins charged and received by the producer, the packer, the merchant and the retailer. Inevitably, the grower/packer has complained that he has had to bear the cost of prepacking, but no doubt he also grumbled when marketing conditions compelled him to package his goods in 40 lb units instead of by the horse-drawn-cart load!

Many of the prepack sections attached to farms are not working economically, and in many cases they are being subsidized by the parent firm. Inquiries often show that transport is not costed out sufficiently accurately, and frequently existing buildings on the farm are used to accommodate the prepack equipment.

It has been contended that prepacking is completely uneconomic for all concerned. Maybe this is true, but consumers have shown a willingness to buy foodstuffs under self-service conditions, and what the consumer wants the producer must be able to supply.

This article will be concluded in the next issue

SIXTH BRITISH WEED CONTROL CONFERENCE

November 5-8, 1962

Grand Hotel, Brighton

CONFERENCE SECRETARY: W. F. P. BISHOP
140 Bensham Lane, Thornton Heath, Surrey

What kind of control of wood-pigeons are we likely to get, using baits treated with a narcotic? How, at the same time, can we safeguard game and other protected birds?

NARCOTICS *V.* WOOD-PIGEONS

R. K. Murton

A GOOD deal of speculation has been rife lately about the possibility of controlling wood-pigeons by the use of narcotic baits. This has followed some experimental work done in Cambridgeshire by the Ministry of Agriculture. It must be said at once that it is illegal to use poison or stupefying baits in this country except under licence, and it is hoped that in describing the research to date and by outlining plans for further experiments, the subject will be seen in proper perspective.

The idea of catching birds by using narcotics is not new. Poachers, using raisins soaked in alcohol, have been doing it with pheasants for a very long time. They used brandy or whisky—a no less expensive narcotic than that used in present experimental work!

From 1942 to 1945, Colquhoun tried to catch wood-pigeons by using peas soaked in tribromoethanol. Unfortunately this chemical is too unstable and volatile. Most of it was lost through the action of sunlight before the birds were able to eat the bait. Colquhoun achieved little more success when he used the chemical inside gelatin capsules which were made to resemble peas.

In France, Daude (1942) demonstrated that alpha-chloralose was a valuable narcotic for use in bird control, and this substance has been used increasingly in baits to catch various corvids and other harmful species in that country. But little success attended attempts to catch wood-pigeons by this method.

Early trials in this country were similarly unsuccessful because pigeons would not take the treated baits. It has since been realized that the baits were presented on too small a scale, especially out of regard for the safety of other forms of wild life and game species. Since 1959, wood-pigeons and other species have been caught under a wide range of experimental conditions by using various baits coated with a 1·5 per cent by weight application of alpha-chloralose.

Presenting the bait

It is important to understand why birds eat the foods they do. Choice is determined by an instinctive recognition of the things which are right to eat, but this is modified by experience and learning in later life. The context

or way in which a food occurs is also important, and all these conditions vary from species to species. In winter, wood-pigeons feed regularly on clover which they get from leys or pastures, but they prefer grain. But they will not feed on grain unless it occurs frequently enough for them to 'learn' that it is available.

When feeding, they do not alternate between different foods, but develop what is called a 'search image' for one particular food at a time. They can be induced to eat either peas or grain if enough is spread on a pasture, and in so doing most of them will ignore the clover. In practice, about 80 per cent of a flock will take grain under these conditions when the density equals one grain per square foot. If a mixed bait of peas and wheat is laid, then the birds will take the grain first and the peas will be eaten only when the wheat density drops below a certain level.

Successful baiting requires widespread application of the bait at the correct density, and it is not possible to confine the bait to small heaps or localized areas. This means that once baits have been laid they cannot be retrieved and it is necessary to wait for them to be cleared by the birds or otherwise lost through soil settlement, decomposition or farming operations. Alpha-chloralose is very stable, and in our trials we have had to think carefully before laying a bait which would be a potential hazard to wild life for two or more months.

Effectiveness of the narcotic

In theory, the object of using a narcotic is that protected or game species are allowed to recover and be released unharmed; in practice, this is not entirely feasible. Different species react in different ways to the drug; some are very sensitive, others relatively unharmed. Quite distinct from this reaction are the different results which follow variations in the total amount of drug consumed. The intake for a particular species is governed by the speed at which it finds and eats the bait—a function of the bait density—the concentration of narcotic on the bait and the presence or absence of any storage organ such as the crop of pigeons and game birds.

Some of these factors can be adjusted by the experimenter, but there are limits. Using wheat, barley, pea and bean baits, containing 1·5 per cent by weight of alpha-chloralose, it was found that 80–90 per cent of the wood-pigeons, pheasants and partridges recovered, whereas less then 50 per cent of the finches and only 46 per cent of the corvids (rook, carrion crow, jackdaw and jay combined) did so. Illustrating the differences in sensitivity between closely related species, only 38 per cent of the stock-doves recovered, compared with 81 per cent of the wood-pigeons.

These survival rates were applicable only when birds were collected at least twice a day and cared for in wicker baskets until they recovered. Had they been left on the fields, the resultant mortality would have been much higher, due to exposure to cold winds and rain and predators.

What trials show

In a series of thirty-four trials in the winters of 1959–60 and 1960–61, using mainly cereal baits, 1,408 birds were captured. Fifty-seven per cent were wood-pigeons, 23 per cent were other species harmful to agriculture and classified in Schedule 2 of the Protection of Birds Act, 1954, and the remainder

were legally protected and game species. Grain baits were tested on spring grain sowings, stubbles with grain, clover leys with grain and pastures. Proportionately, more protected and game species were caught on the sites where grain was normally to be found than on pastures; the captures reflected the natural distribution of the grain-eating birds. On pastures, 74 per cent of the birds caught were wood-pigeons, 20 per cent species classified as harmful to agriculture, 5 per cent game birds and 1 per cent legally protected small birds.

One per cent protected species seems a small proportion at first sight but it must be realized that these birds were numerically less common than wood-pigeons in the first instance. It is imperative, therefore, that the danger to protected species be further reduced or if possible eliminated.

Fortunately, it appears that the risk to small protected birds can be removed if baits such as peas and beans are used. Although these are not so attractive as wheat or barley, they are too large for small birds to eat and in a limited number of trials involving their use only wood-pigeons, stock-doves, corvids and game birds were caught. But more trials are necessary to make certain that the present tentative conclusions regarding the effects on protected species are justified.

The efficiency of using narcotic baits to catch wood-pigeons was measured in various ways. Some birds were allowed to recover and marked before release. Some of these were recaptured, enabling estimates to be made of the population size. This method makes use of the fact that the total number of marked birds released divided by the proportion of marked birds among subsequent recaptures bears a definite relationship to the total population. Such estimates were checked against the results of direct counts, and it appeared that with some very limited trials we were able to capture more than half the pigeons at risk. Even better results are likely to be obtained if the baits are spread more widely.

The cost of killing individual birds proved to be less than the cost of shooting and nest destruction. But although this method of control is the cheapest and most efficient so far developed, we need to know more about the possible effects on other species. The cost of a dead pheasant or partridge has to be considered and may offset other advantages.

More trials this winter

It has proved possible to catch wood-pigeons with pea or bean baits. Depending on the site of an operation (those without natural grain seem to be the safest), some game birds are also captured, and of these 10–20 per cent will die. It remains to be seen whether game mortality can be kept low enough in relation to the number of pigeons killed for the method to be economically worth while and acceptable. Trials will be made this winter in eastern England. These will be under the control of the Ministry's headquarters and regional staffs, but involving operators not possessing the special experience of the workers so far concerned. The trials will be confined to leys and pastures and the results will be assessed at the end of the season.

Further work is being concentrated on the search for even more selective baits and improvements in baiting techniques. This is involving a very detailed study of the food preferences of the pigeons and game birds. It is conceivable that artificial foods can be developed which only one species will eat, or that certain exotic foods or mixtures might prove valuable. At

this stage such ideas are speculative and there is no guarantee that a satisfactory answer will be found. If two different animals compete for exactly the same food under the same circumstances, the one which is best adapted to collecting that food will survive at the expense of the other. In practice this does not arise because all species are segregated by the differences in food preferences and environment. The possibility of exploiting this principle does give some reason for optimism.

Any form of wood-pigeon control must take into account the interests of wild-life preservation, of sporting traditions and of food production. Hence the wood-pigeon problem is a particularly difficult one.

Dr. R. K. Murton, who has been responsible for the wood-pigeon trials referred to in this article, is a Senior Scientific Officer in the Ministry's Infestation Control Laboratory at Worplesdon, Surrey.

The Ministry's Publications

Since the list published in the September, 1962, issue of *Agriculture* (p. 296), the following publications have been issued.

ADVISORY LEAFLETS

(Price 3d.—by post 6d.)

No. 86. Glasshouse Whitefly (Revised)

No. 112. Goose Production (Revised)

No. 299. Brussels Sprouts (Revised)

No. 352. Violets (Revised)

No. 382. Brewers' Grains (Revised)

No. 460. Stem and Bulb Eelworm on Narcissi, Hyacinths and Related Bulbs (Revised)

No. 471. Seeds and Potting Composts (Revised)

No. 511. Intensive Stocking of Sheep (New)

OTHER PUBLICATIONS

Infestation Control: A Service to Agriculture and Food Storage, 1959-61 (Revised) 6*s.* 6*d.* (by post 6*s.* 11*d.*)

A report dealing with the research work on harmful pests undertaken by the Ministry's Infestation Control Laboratory.

Experimental Horticulture No. 7 (New) 6*s.* 6*d.* (by post 6*s.* 11*d.*)

Contents include: Cost of home production of early potato seed; The stopping of Brussels sprouts; Growing onions for pickling; Shelter screens at Luddington; Spacing for tomatoes; Raising plants for the unheated tomato crops; Tomato variety trials.

Experimental Husbandry Farms and Horticulture Stations—Progress Report 1962 (New, 4*s.* 6*d.* (by post 4*s.* 11*d.*)

Tractor Ploughing (Revised) 3*s.* 6*d.* (by post 3*s.* 11*d.*)

Report on Animal Health Services in Great Britain 1960 (New) 6*s.* 6*d.* (by post 7*s.*)

54. Upton-upon-Severn, Worcs

J. H. Murray

THE Upton-upon-Severn and South Martley district of Worcestershire comprises the Rural District of Upton-upon-Severn plus some ten parishes of Martley Rural District. Situated in the south-west corner of the county, it covers approximately 75,000 acres. It is bounded on the south by the Gloucestershire border, to the west by the Malvern Hills, and has a single line of parishes on the east of the River Severn. The area is dominated by the Malverns, which rise abruptly from the Severn valley and form a natural and very lovely background.

Apart from the Malverns, most of the land is below the 100-foot contour, but there is some pleasant undulating country to the north of the River Teme, which runs across the district and enters the Severn just south of Worcester. The small town of Upton-upon-Severn is in the centre of the district, and in bygone days was a busy port for river traffic. A relic of those days is the large number of public houses! The only other town is Malvern, which has little to do with the rural activities of the area. There is a small market at Upton, but most farmers send their stock to Worcester, Gloucester or Ledbury.

The farming population is fairly settled, many families having been in the district for generations. The continued existence of several estates contributes to this pattern. In the south-west corner, bordering on the large commons, the people are independent and resistant to change, an attitude which stems from the isolation of that part until recent years and the fierce opposition put up against enclosures. Holdings vary greatly in size but there are few really large farms; sixty per cent are of less than 50 acres. Buildings are usually old but reasonably well maintained, and the main need has been for the provision of cattle yards to prevent the grassland being trodden up in winter.

There is a great diversity of farming activities because the soils in certain areas lend themselves to specialized types of husbandry, but the main products in order of importance are milk, cereals, beef and sheep. Basically, the geology is Keuper Marl, and most of the district has the typical heavy red soils of this formation. The two river valleys have rich deposits of alluvial soils in fairly narrow terraces, and in the south there are large areas of former marshland which, although now drained, flood every winter. The soil in

these marshes and their surrounds is a heavy grey clay of the Birtsmorton series. Under the Malvern Hills is a belt of Malvern drift, a gravelly soil in which is found a curious ironstone accretion known locally as 'motherstone'. It literally grows in the ground, and resembles lumps of rough concrete which can play havoc with implements. The district is in the rain shadow of the Malverns and, with an annual rainfall of less than twenty-four inches, is exceptionally dry for the West Midlands. In most years May and early June are very dry, but extremes of winter weather are rare.

The red marl soil is fertile and will grow good cereal crops provided ditches and drains are properly maintained. Most of the dairy herds are found on this soil, but cereals are grown in rotations based on ley farming. On the low-lying heavy soils of the south there is less arable cropping, more permanent grass, and beef, sheep and dairying are of equal importance. The marsh areas provide excellent grazing and hay crops even in a dry year, but are only suitable for summering cattle.

The fertile alluvial soils of the Severn terraces are mainly on the east of the river. Here there is a long tradition of growing peas and spring cabbage in rotation with cereals and root crops. Local strains of cabbage have been selected for many years and are greatly prized, seed being sold all over the country. With plenty of water available from the river, the practice of irrigation is increasing, and in consequence an ever-growing acreage is being utilized for market garden crops. The Teme valley and the area to the north-west has a considerable acreage of hops and fruit, mainly apples, cherries and black currants. The orchards are scattered, and at blossom time this undulating country presents a very beautiful picture. Cereals are also grown in this area, and beef is more popular than dairying. On many hop farms matched bunches of magnificent Hereford cattle are fattened, without much financial gain but for their 'muck and company'.

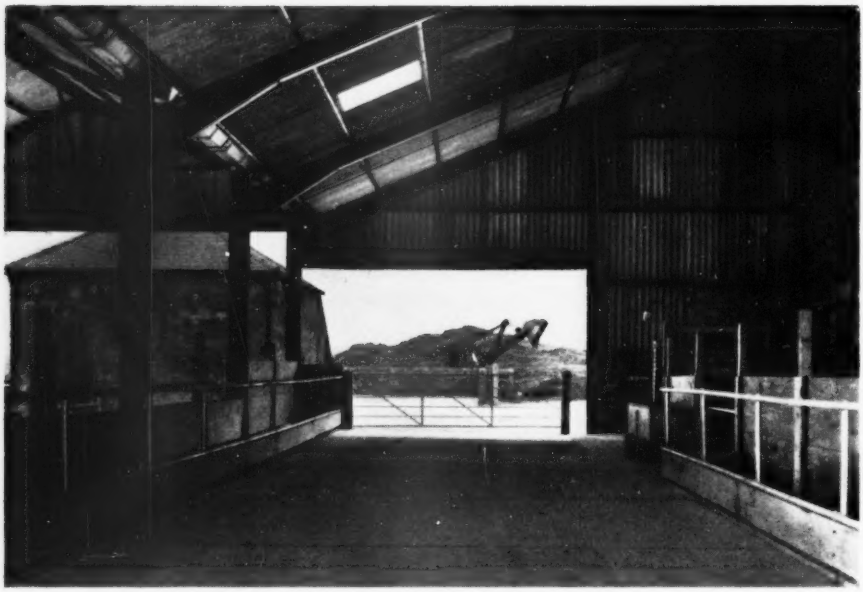
A feature of the district is the 2,250 acres of common land, which is more than is found in the whole of the rest of the county. Most of it is at the south end of the Malverns, and although common rights are jealously guarded, there is little or no control of grazing. This means that mowing and fertilizing are not practised, with the result that gorse and bracken abound and grazing is of poor quality. There are numerous smallholdings bordering on the commons and the search for more land has led to considerable fragmentation. A visit to all the land of a 20-acre holding can entail a journey of up to five miles. Certain large river meadows on both Severn and Teme are 'commonable', i.e., they are opened to common grazing after the hay has been cut. The parish of Powick has a most complex system whereby certain Teme meadows are common every third year only.

The district is well served by good roads. Two recent additions, the M.5 and M.50 motorways, brought complications to farming during their construction, but they are already becoming an accepted feature of the landscape. The Three Counties Show has found a permanent home on a site close to Malvern, and, with the hills as a background, must be one of the loveliest showgrounds in the country.

Life in the Severn valley may appear to move at a leisurely pace, but this in no way affects the efficiency of its agriculture. There is a satisfaction in farming which can only be found in a truly rural area.

T. E. KING
Agricultural Land Service, Reading

Planned for the Job



The 'tail-to-tail' feeding area, with portable barriers and plywood panels

WE were asked to advise about the provision of buildings in which one man could milk and manage sixty milking cows. The buildings and equipment were to be used to capacity all the year round and be capable of expansion or internal adaptation. The unit described here has achieved that objective.

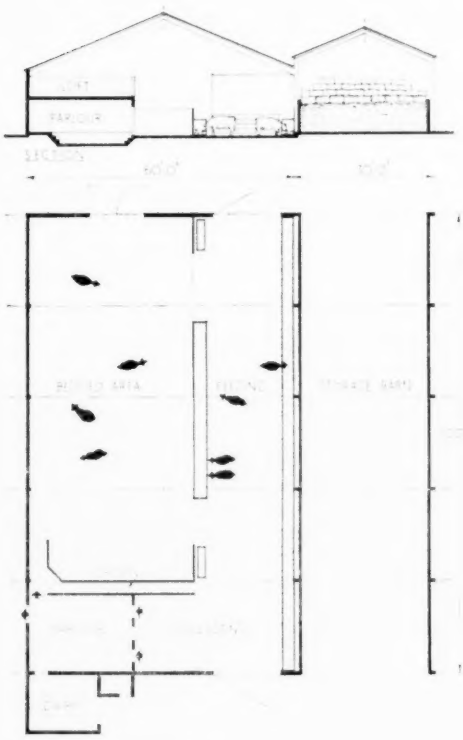
Before putting pencil to paper a policy of cow management was clearly defined and the cowman's work routine carefully planned. Suitable equipment for milking, feeding and cleaning was also reviewed and selected.

The whole unit, with the exception of the dairy, is arranged under two linked clear span steel structures measuring 90 ft by 100 ft overall.

It was considered desirable to keep milking time down to 1½ hours, so an eight-stall four-unit herringbone parlour was chosen. Concentrates are delivered and stored in bulk in a loft over, and fed through automatic

hoppers controlled from the pit. Throughput is forty cows in just under the hour.

Milking equipment is cleaned in position. The operation is automatic and takes about 25 minutes, during which time the cowman cleans the parlour and dairy. Cleaning the bulk milk tank takes about 15 minutes. At the winter exit from the parlour there is a crush for holding cows for A.I. or veterinary attention, and a footbath is incorporated in the summer exit. A collecting yard is formed by placing a wheeled barrier or electric wire across part of the feeding area. The yard is planned for sixty cows at 90 sq. ft each for the larger breeds but it would hold about seventy cows of the smaller breeds. It is set up for manger feeding, but self- or easy feeding could be practised. Cows stand tail to tail and feed from the floor through a simple barrier which can be dismantled. It costs about 37*s.* per cow.



Plan and Sections of buildings

By separating the bed from the feeding area, cows can be held in either place as required and an independent feeding passage is dispensed with at a saving of some £300. The division is made up of 8 ft × 2 ft × 3 in. portable plywood panels and timber posts. Similar panels could be used for walling in the building, or to form silo sides or temporary pens and partitions. The plywood is Douglas Fir, W.B.P. grade for exterior use.

The concrete feeding area, which is 16 ft between mangers, has no dead ends or catchpits and, with an efficient blade, scraping and disposal of dung to a nearby midden takes about 15 minutes daily.

The barn will store sufficient food and bedding for 150 days. Silage capacity is about 350–400 tons, plus 110 tons of hay and or straw.

Straw consumption, based on 150 days, is about 42 tons, including an initial covering of 9 tons. This is approximately 14 cwt per cow. No watering or feeding is done on the bed and across the entrance a baulk of timber is hung to prevent the dung pack and straw from being dragged on to the concrete.

All internal divisions, barriers, etc., are removable, thus allowing the floor space to be rearranged or converted to other uses.

Agricultural Chemicals Approval Scheme

Additions to the 1962 List of Approved Products

THE following additional products have been approved under the Agricultural Chemicals Approval Scheme. The second List of Approved Products was published on 1st February, 1962.

FUNGICIDES

MANEB—*Wettable powders*

Croptex Potato Fungicide—Crop Protection Ltd.

HERBICIDES

CHLORPROPHAM with DIURON

A residual herbicide mixture specifically formulated for the control of many germinating annual weeds in certain bulb crops before emergence.

Liquid Formulations

Residuren—Farm Protection Ltd.

DALAPON—*Sodium Salt Formulations*

Bugges Dalapon—Bugges Insecticides Ltd.

Cleanacres Dalapon—Cleanacres Ltd.

DINOSEB (DNBP)—*Formulations in Oil*

New Razetops—Vigzol Oil Co. Ltd.

SODIUM MONOCHLOROACETATE

A contact herbicide for the control of many annual weeds in marrowstem and thousand-headed kale, Brussels sprouts, cabbage, onions and leeks.

Monoxone—Plant Protection Ltd.

SEED DRESSINGS

ORGANO-MERCURY with *gamma*-BHC DRY SEED DRESSINGS

Duke's Dual Purpose Powder Seed Dressings—James Duke and Son Ltd.

MISCELLANEOUS

METHAM-SODIUM—*Liquid Formulations*

Vapam—Murphy Chemical Co. Ltd.

SPECIAL NOTE

Withdrawal of approval from products containing Fluoroacetamide

It has been found necessary to withdraw approval from the products 'Megatox' (W. J. Craven and Co. Ltd.), 'Megatox' (Midox Agricultural Division of Rentokil Laboratories Ltd.) and 'Vitax F 15' (Vitax Ltd.), all of which are based on fluoroacetamide.

Experience over a period of years has revealed that the initial promise shown by fluoroacetamide for the control of aphids on sugar beet and brassicas has not been maintained.

IN BRIEF

Milk Quality Schemes

Two milk quality schemes came into operation on 1st October, 1962.

Compositional Quality Scheme

All producers selling by wholesale will have their supplies tested for total solids, solids-not-fat and butterfat each month from 1st October, 1962.

In October, 1963, the Milk Marketing Board will place each supply in one of three classes according to the annual average total solids and solids-not-fat content of the supply. The annual average will be determined by the simple average of a minimum of ten out of twelve monthly tests taken during the preceding year.

Every six months thereafter classification will be repeated, thus allowing for a change of class according to the most recent average.

The Milk Marketing Board will pay different prices according to the class in which the supply is placed, except in the case of milk sold under a Channel Islands or South Devon contract, in which case the standard price for Class B will be paid, plus the appropriate Channel Islands or South Devon premium.

Class	*Total Solids*	*S.N.F.*	*Price variation*
A	12·6% or above and	above 8·4%	Standard price + 2*d.*
B	less than 12·6% but of at least 12% and	above 8·4%	Standard price
C(1)	less than 12% but of at least 11·8% or	8·4% or less	Standard price less 2*d.*
C(2)	less than 11·8%	—	Standard price less 3*d.*

All supplies which cannot be classified by reason of insufficient tests over the preceding period will be placed in Class B. This class includes retail sales by producer/retailers, farmhouse cheesemakers and new producers.

Hygienic Quality Scheme

(a) Rejection Procedure.

Under this scheme producers' wholesale supplies are liable to rejection if sour, tainted, or containing blood; or if the milk fails to pass a platform rejection test (disc $3\frac{1}{2}$).

(b) Routine monthly testing.

Supplies which are accepted as marketable will be given a regular monthly test for hygienic quality. The test is a resazurin test of two hours' duration between May and October, or three hours' between November and April. Supplies which do not pass this test will be regarded as failing.

Testing began on 1st October, 1962, but no price deductions will be decided upon before October, 1963.

It is proposed that these deductions, when decided upon, should apply to all gallons sold during a month in which the test fails to reach the prescribed standard, unless the results of all tests for that supply in the immediately preceding six months have been 'pass'.

How the Nation Eats

The National Food Survey Committee's report on Domestic Food Consumption and Expenditure for 1960—the eleventh of its kind—gives detailed results showing the effects of family size and composition, income and locality on our diet. The survey is based on records kept by 8,891 households in 48 parliamentary constituencies, covering both urban and rural areas.

The average weekly expenditure on food rose from 29*s*. 3*d*. per head in 1959 to 29*s*. 8*d*. in 1960, although the general level of food prices fell slightly. Over the five years 1956–60, prepared or semi-prepared foods, to which less than a fifth of the average household food budget was devoted, accounted for four-fifths of the increase in the real value of food purchases; for such 'convenience' foods, purchases increased by 17 per cent, as against 1 per cent for all other foods. Their growing popularity is probably attributable to housewives taking up paid employment and so increasing the family income, but having less time to prepare meals.

Although this 'service' element in food expenditure is increasing, the proportion of the domestic budget which is devoted to food has been falling since 1956, and for nearly all food groups the percentage rise in expenditure for a given difference in income is greater than the corresponding rise in quantity. As real incomes rise, therefore, more and more households may be expected to buy quality or service rather than merely larger quantities, and the demand for one food after another will tend to approach saturation level. In terms of calories, apart from population increase, the market for one food can only expand at the expense of another.

Total consumption of meat changed very little between 1956 and 1960, but imports of beef (and therefore purchases) declined, while consumption of processed meats increased appreciably and that of poultry trebled. The market for broilers widened considerably, especially in the larger towns; the present association between town size and purchases of poultry may well be explained by the marketing policy of the large-scale broiler producers, but new food habits usually tend to spread from London outwards.

The total weekly milk consumption of 5·12 pints per head has increased somewhat since 1959 because of increased purchases of full-price liquid milk. Household consumption of cheese, eggs, potatoes and green vegetables (other than cabbage) increased, but the expanding demand for fresh fruit was not matched by increased supplies. Purchases of cakes and biscuits increased, but less bread was bought.

The nutritive value of the average household diet was satisfactory, as was that in most of the types of household considered. In particular, the largest families recorded improvements compared with 1959.

The Report is available from H.M. Stationery Office, or through any bookseller, price 12*s*. 6*d*.

Profit Indicators for Pigs

Since the longer a pig is on the farm the more it costs to keep it, it is only reasonable that the heavy pig of 260 lb live weight should fetch more than a baconer of 200 lb, or a porker of 140 lb. The really important profit indicators in pig production are the number of weaners produced per sow each year and the quantity and cost of food required for both the breeding herd and fattening pigs. Producers whose pigs achieve a high standard of performance are making twice as much profit as the average. Food is the biggest cost—80 per cent of the total.

The average number of litters per sow in herd is 1·75 a year, giving an output of 14 weaners per sow a year. The better herds manage to produce 16 weaners per sow each year by having more litters, more pigs in a litter and fewer pre-weaning deaths.

On average, the food requirement of the breeding herd is equivalent to 32 cwt per sow a year, or 2·3 cwt per weaner produced. This includes food fed to the sows, the boars and the unweaned pigs.

The quantity of food used for breeding stock varies from herd to herd and ranges from 25 cwt to 40 cwt per sow. Most of this wide variation is due to the management of the sow. Even though the food may be weighed before it is given to a group of sows running together, some do not receive their fair share. Such under-fed sows lose condition and need extra feeding before farrowing. Individual feeding helps to overcome this difficulty and allows the pigman to give a little extra to any sow in poor condition.

The second stage of pig production is from weaning until the pigs are sold, measuring the standard of performance at this stage by the food conversion ratio. This is an excellent method, but it fails to take into consideration the cost of the food. A better standard is the cost of food per lb liveweight gain. For example, a food conversion rate of 3·6 may seem better than one of 4·2, but if the meals used are priced at 28*s*. and 24*s*. per cwt respectively there is no difference; both have a cost of 10*s*. 8*d*. per lb liveweight gain. The table below shows the effect of the conversion rate and the price of meal on food costs per lb liveweight gain.

Conversion rate	Price of meal per cwt				
	24*s*.	26*s*.	28*s*.	30*s*.	32*s*.
	d.	*d*.	*d*.	*d*.	*d*.
3·0	7·7	8·3	9·0	9·7	10·3
3·2	8·2	8·9	9·6	10·3	11·0
3·4	8·7	9·5	10·2	10·9	11·7
3·6	9·3	10·0	10·8	11·6	12·3
3·8	9·8	10·6	11·4	12·2	13·0
4·0	10·3	11·1	12·0	12·9	13·7
4·2	10·8	11·7	12·6	13·5	14·4
4·4	11·3	12·3	13·2	14·1	15·1

Take two examples:

1. If food costs 28*s*. per cwt, a reduction of 0·1 in the conversion rate means a saving of 4*s*. 3*d*. in the cost of fattening a weaner to bacon weight, or £21 per 100 pigs.

2. If the conversion rate is 4·0, a reduction of 1*s*. per cwt of fattening meal would save 6*s*. per pig, or £30 per 100 pigs.

A profitable pig enterprise is usually one where records are kept to keep an eye on the level of performance.

R. F. Ridgeon

Beef Buildings Competition

How well are you housing your beef? This year's Country Landowners' Association competition takes as its subject accommodation for beef production. Prizes are (1st) £150, (2nd) £75, and (3rd) £50.

Buildings entered may be standard productions, new or old buildings, or conversions, and they will be judged on the facilities they offer for economical operation, disposal of manure and effluents, comfort and well-being of cattle, siting and layout, value for money, and appearance—in that order. The labour involved, feeding systems and the relationship of feed stores to the cattle building will also be taken into consideration.

Competitors are required to submit plans or simple scale diagrams by 17th December, 1962, showing the layout of the accommodation in relation to the storage of bulk feeds, concentrates and bedding materials; also to state the number of cattle provided for, seasons of use, the labour requirements in man-hours per week, methods of handling (including testing), weighing, feeding, cleaning out, the estimated annual production of fat cattle, the approximate gross cost of the accommodation, whether new or converted, and the equipment contained in it.

Entrants may be the designers, owners, or occupiers of the accommodation.

Entry forms and full details may be obtained from the Competition Secretary, Country Landowners' Association, 7 Swallow Street, London, W.1.

Plough Right

Ploughmen have given up plodding their weary way—whether homeward or round and round the field. The great motive force of tractors has displaced that particular form of exercise; but it has introduced a new kind of skill.

Ploughing is one of the slowest and most expensive tillage operations, and so a good deal of time and money can be wasted if it isn't done well and accurately. Economy here depends on knowing how to set out and plough fields as efficiently as possible, whatever their shape. Modern machinery like spacing drills, thinners and forage harvesters call for systems of ploughing different from those long practised with horse and trailed tractor ploughs. There are, for example, few British fields that would not be more level, and therefore more suitable for modern machinery, if they were ploughed on the square or one-way instead of in-lands.

The well-illustrated new edition of the Ministry's booklet *Tractor Ploughing* shows what good ploughing can do, and how it can be achieved.

Another point about ploughing, and one which tends to be forgotten in these days of a plethora of chemicals, is that the mouldboard plough can be one of the most potent of weed-killers. Many weeds which might survive if loosened and left on the surface will die if they are turned over by the plough and buried completely beneath a layer of soil. Good ploughing, therefore, kills more weeds than bad ploughing, so it pays every farmer to get as much free weed control as possible by ploughing well.

The booklet is obtainable from H.M. Stationery Office or through any bookseller, price 3*s.* 6*d.*

Plant Pathology Laboratory : New Director

Mr. W. C. Moore, C.B.E., M.A., Director of the Plant Pathology Laboratory, Harpenden, is retiring on 2nd November, 1962. He will be succeeded by Dr. M. Cohen, M.Sc., Ph.D., at present serving as Deputy Regional Director in the N.A.A.S. at Newcastle.

Mr. W. C. Moore was appointed Director of the Plant Pathology Laboratory in 1949. He led the United Kingdom Delegation to the Commonwealth Mycological Conference in 1954 and 1960. He is past president of the British Mycological Society and of the Association of Applied Biologists. He is also the author of many scientific papers on diseases of agricultural and horticultural plants.

Dr. M. Cohen entered the National Agricultural Advisory Service on its inception in 1946, became Assistant to the Senior Advisory Officer (Science) at headquarters in 1956, and was appointed Deputy Regional Director of the N.A.A.S. in the Northern Region in 1958. He was an alternate United Kingdom delegate to the Commonwealth Agricultural Bureaux Review Conference in 1960 and is the author of a number of scientific papers on pests of agricultural and horticultural crops and their control.

Sugar Beet Pulp Nuts in Bulk

The British Sugar Corporation is now making sugar beet pulp in nut form. Mr. E. J. Cousins of the Bury St. Edmunds sugar factory writes about it in the current issue of the *British Sugar Beet Review*.

Taking pulp in this convenient form and in bulk has obvious advantages. 'An ordinary lorry delivering 8 tons of beet will hold about 6–7½ tons of nuts in bulk', says Mr. Cousins. All that is needed is a few bags put round the side ladders. When the floor of the lorry was wet, the factory covered it with stout paper or a lorry sheet.

Given a suitable tipping place within a barn, the operation takes only a few minutes. Saving: £6–7 a load and no labour.

Books

The Farmer's Guide to the Law. D. H. CHAPMAN and J. V. DAVIES. The Estates Gazette. 37*s.* 6*d.*

It is said that when solicitors meet on convivial occasions one of the principal toasts of the evening is 'to the testator who makes his own will'. This apparent altruism on the part of the profession proves, on closer investigation, to be founded on the mundane belief, born of experience, that it is the home-made will which stands the best chance of ending up in the House of Lords—to the enrichment of all concerned other than the testator's dependants. It is therefore with some reserve that one approaches any book which sets out to explain the law to the layman in simple terms.

Any misgivings on this score are, however, quickly dispelled by only a cursory reading of the Farmers' Guide which, in the authors' words, 'by providing a middle course between taking professional advice, and taking no advice at all, may help the farmer to avoid some of the commoner traps which the law sets for everyone'. Indeed, the very range of problems dealt with in the Guide—by any of which, without exaggeration, the twentieth century farmer may find himself at any time confronted—amply demonstrates the need for such a publication. While not setting out to solve every problem, the Guide explains in simple everyday English the legal principles at stake, and tells the farmer 'what to do until the solicitor comes'.

Naturally in a work of this scope there are bound to be some minor imperfections. Thus it is not true, as is maintained in the chapter dealing with agricultural wages, that it is the Minister of Agriculture who makes regulations prescribing minimum wages. This is the function of the entirely independent Agricultural Wages Board (whose orders are not subject to ministerial confirmation)—a fact not without significance during the recent 'pay pause'. Nor, when discussing the thorny problem of liability to pay wages during sickness, is any mention made of the all-important decision in *Orman v. Saville Sportswear Ltd.* (1960).

There might also, with advantage, have been a chapter on the law of agricultural subsidies, a knowledge of which is essential to present-day farming and, most of all, an index which would have enabled the reader to put his finger quickly on the point he was seeking.

These minor blemishes do not, however, detract from the value of the work as a whole; and the authors are to be congratulated on the attractive manner in which they have pioneered their somewhat formidable task—a task which they may be fairly said to have achieved. The book is amusingly illustrated.

G.F.A.

An Introduction to Sampling Theory. M. R. SAMPFORD. Oliver and Boyd. 30*s.*

Dr. Sampford's book cannot be regarded either as an easy introduction to the principles associated with sampling or as a rigorous mathematical exposition of sampling theory. It is designed chiefly for those who wish to apply sampling techniques in practice and need to know enough of the theory to enable them to choose appropriate sampling procedures and analyse the results correctly. Dr. Sampford does not consider that an introduction to the more elementary sampling designs would meet this need because most of the designs which are of practical importance are complicated.

The reader must have some aptitude for mathematics to derive much benefit from the book, or at least a determination not to be put off by many algebraic symbols and formulae. Exercises are provided at the end of each chapter, and logical proofs of some of the more basic theorems are given in an appendix. In fact, it is a book which not only requires, but will repay, study.

Topics covered include systematic, stratified, cluster and multistage sampling, and the use of regression and the ratio methods. Most of the presentation is confined to the problem of obtaining reasonable estimates of average values by sampling from populations—such as average yields, acreages devoted to crops, etc.,—but a chapter is added relating to the special problems of sampling to determine percentages in the base population.

The suitability of different methods is discussed in relation to the precision of the estimates, the possibility of obtaining good estimates of the margin of error, the cost involved, and the preliminary knowledge of the population which is required in order to apply each technique.

A recurring theme is the different approach necessary in under-developed

areas which have not previously been surveyed or where there is no census or other data to provide a frame of reference.

G.T.J.

Genetic Aspects of Dairy Cattle Breeding. IVAR JOHANSSON. Oliver and Boyd. 40*s*.

This is a most interesting book which will be useful to specialists in cattle breeding, to students of 'applied' genetics and perhaps to the more persevering of practical breeders. Professor Johansson has contributed prolifically to the subject he now reviews and it has earned him the widest respect. The book therefore bears the stamp of authority. It is excellent for what it primarily sets out to be, i.e., a reservoir of information and a critical review of the literature on the inheritance of characteristics of economic importance in dairy cattle, and on the relationships of these different characters to each other and to environment.

Some of the chapters are about highly topical subjects, e.g., the relationship of body size, growth rate, muscular development and type to milk yield, and the causes of variation in milk composition and the interrelation between the different constituents. However, Professor Johansson has made the task of understanding his book more difficult than it need be to those unversed in statistics and population genetics because, generally speaking, he has preferred technical to popular explanations. Perhaps with a view to educating the uninitiated, the first chapter of the book is devoted to a summary of the subject of population genetics. This, I believe, will confuse rather than enlighten those not already familiar with the appropriate jargon because the author has resisted any temptation to simplify.

Surprisingly, there is no mention of the many studies which demonstrate the hierarchical structure in the organization of cattle breeds and which discuss or show the genetic implications of this. Even before the advent of A.I., bull breeding was in the hands of a few, and genetic progress in each breed depended on the advance, if any, in these few herds. This advance, it has been shown, was not what it might be. Will progress be any greater in future? Professor Johansson states that 'prospects are good' and that 'practically all characters of economic importance can be improved by selection'.

One hopes that this will not be interpreted by breeders, or their Associations, as encouragement to pay attention simultaneously to so many characteristics of each cow that in the end no factor is adequately improved. To the author's rational mind, of course, priorities and methods are established by geneticists.

Perhaps for future editions Professor Johansson might be persuaded to discuss at greater length how the theory of breeding and the experimental findings can, or should, be applied to practice.

G.W.

Seed Identification Manual. ALEXANDER C. MARTIN and WILLIAM D. BARKLEY. University of California Press. London: Cambridge University Press. 80*s*.

The authors state that this book has been written to help agriculturists, foresters, wild life biologists and others interested in land use programmes to identify the seeds in their particular ecological fields. It is devoted to the seeds of selected plant species which are of economic or agricultural importance in the United States of America. But although it may be of interest to agricultural botanists in this country, it is unlikely to be used as a reference book by farmers, advisory officers or seed analysts. Only 18 out of 824 photographs are devoted to crop seeds, and the weed seeds depicted are mainly of American species.

The photographs of the weed seeds are presented first in order of families and again in groups with similar morphological characters; in a few cases there are three identical plates of the same seeds. Little is gained by this repetition, and the space could have been more profitably used to increase the number of crop species. The quality of the photographs is variable; some are very good, but others are so indistinct that the seeds cannot be recognized with certainty.

The second part of the book indicates the clues to identification provided by features common to seeds of important families and genera, with diagrams illustrating the internal and external morphology. But there are no detailed descriptions of the seeds of particular species accompanying the photographs in the first part of the book.

Many authoritative books on seed identification have been written in the past 100 years and some are listed by the present authors. None of them can, however, replace a good reference collection of named seeds and facilities for producing and identifying a mature plant from an unknown seed as the most reliable means of seed identification. The present manual is no exception.

C.E.Q.

The Motor Apparatus of the Mammary Gland. M. G. ZAKS. Oliver and Boyd. 40*s*.

This translation by D. G. Fry from a previous Russian text is a critical review of work on the physiology of lactation in 'the Soviet Union and abroad'.

Professor Zaks discusses present theories concerning the storage and ejection of milk. He maintains that the hypothesis that intramammary pressure above a certain level has a negative effect on milk secretion still holds, but concludes that the pressure rise in the cistern in the intervals between milkings is quite insignificant and clearly not in proportion to the degree of filling. He contends that the level of critical pressure, which is influenced by changes in muscle tone within the gland, takes on new values at different stages in the lactation.

Milk ejection is described as an extremely complex act involving a series of reflexes taking place simultaneously and current theories on their nature and control are reviewed.

The effects of milk removal on milk synthesis, the fat content of the milk and the distribution of fat within the gland are considered, and the book should be of interest to animal husbandrymen, since the author has devoted a chapter to some of the features of mammary gland function in milking practice.

The translator, and the editor, A. T. Cowie, are to be congratulated on the high standard of the English text. The illustrations are good, although the legends are in the main inadequate. The minor errors to be found among over 200 references to original work (134 of which are Russian), and the latitude used when quoting the titles of non-Russian papers, will no doubt be corrected in subsequent editions.

This book should be invaluable to the specialist in mammary gland physiology as a source of information previously not readily accessible. Veterinary surgeons and other practical workers will find it of interest.

D. McE. J.

An Introduction to Statistical Science in Agriculture (2nd edition). D. J. FINNEY. Oliver and Boyd. 30*s*.

It is now generally accepted that research workers in agriculture and those who have to apply the results of agricultural research should have some understanding of statistical methods. Unfortunately, there are very few text-books on statistics that cater for the reader who has little or no training in mathematics. Those that do are generally of the 'cook-book' variety. They provide 'recipes' for the design and analysis of experiments without explaining in any detail the principles involved.

Dr. Finney's book concentrates on the basic principles and explains them in a way that even the most non-mathematical reader can understand. Most research workers, no matter how competent statistically, would benefit from reading it. As the title suggests, however, it is only an introduction. The research scientist who wishes to become at all proficient in designing and analysing his own experiments will also have to read some of the more advanced text-books on statistics.

I would have preferred to see more emphasis placed on confidence limits and the estimation of treatment effects rather than on the testing of hypotheses. The discussion of factorial experiments could have contained more on the importance of estimating with sufficient accuracy the effect of each separate treatment when, as is often the case, there are sizable interactions between the different factors.

This is a second edition. The text of the first edition has been completely revised; some difficult sections have been explained more fully; the discussion of randomization, fiducial limits and independence has been improved; more has been included on animal experiments and brief sections on transformations and response surface designs have been added. Two new chapters discuss sampling and its uses and the general planning of experiments.

R.N.C.

Report of the Hannah Dairy Research Institute, 1959-62.

The latest report of the Institute covers the three years ended 31st March, 1962, and is a record of much valuable work done in the various departments.

It deals first with investigations made in connection with the extensive production of feedingstuffs, particularly grass and its conserved products.

Then research concerned with the animals themselves is described, including long-term studies on the efficient utilization of grass as pasture and also as dried grass, hay and silage for the rearing of young stock and for milk production.

Extensive work has been carried out on the metabolism of ruminants and the ability of different feedingstuffs to provide the energy required for growth, maintenance and milk production.

Long-term basic research was undertaken on the effect of climate on the physiology of

cattle, and the nature, control and eradication of mastitis in its various forms was examined.

Another major study covered milk composition, the casein and vitamins of milk and various aspects of chemistry and bacteriology of milk and milk products.

The ultimate purpose of the interesting work done in the Physiology Department on the effect of climate on cattle is to provide basic knowledge that will help towards the improvement of cattle productivity in hot countries. In addition, it may well give information of value in Britain, where knowledge of problems associated with the housing of cattle and efficiency in management is still required. For this work the new climatic laboratory erected in 1959 has been in full use.

The report is worthy of careful study by all who are interested in dairying and its allied subjects. It concludes with a list of publications by members of the staff. Reprints of many of these are available on application. Copies of the Report may be obtained free from The Hannah Dairy Research Institute, Ayr.

S.S.

List of Common British Plant Diseases. BRITISH MYCOLOGICAL SOCIETY. Cambridge University Press. 12*s.* 6*d.*

Despite the title, this is a list of the recommended English common names of several hundred plant diseases, with the scientific name of the fungus or bacterium that causes each: and, for some diseases, the equivalents in one or more foreign languages. The new edition is substantially the same as the previous one, but revisions have been made, especially in the scientific names of powdery mildew and rust fungi, and of bacteria.

Previous editions have been invaluable to pathologists for years, and it may seem ungracious to criticize this one adversely. But times change, and the responsible committee should perhaps re-examine its aims before the next edition, for the list has now a rather academic air. Many uncommon diseases are included, and some entries are justified by tradition rather than by importance. The very success of previous editions means, too, that common names are now relatively stable. Foreign equivalents are given sometimes in one language, sometimes in seven or eight, but the coverage and arrangement is such that the result is not a satisfactory multi-lingual dictionary.

There is a certain 'one-up-manship' in citing the authorities for scientific names of fungi but, with rare exceptions, there is no ambiguity if these are omitted. The specialist now has access to more extensive lists; and the working pathologist is less likely to seek the authority for *Stereum purpureum* than that for what is listed as 'Raspberry leaf curl virus' and for which no authority is given.

But whatever its imperfections, the list in its present form is carefully produced, packs much into small compass, and can be strongly recommended to those who do not have easy access to alternative lists and dictionaries.

I.W.P.

Chalk Downland Afforestation. R. F. WOOD and M. NIMMO. Forestry Commission Bulletin No. 34. H.M. Stationery Office 10*s.*

The well-known geological formation called the Chalk, a type of soft limestone, covers 5,000 square miles, or one-tenth of the land area of England; it stretches out in hills known as 'downs' or 'wolds', from Dorset, through the southern and eastern counties, right up to the East Riding of Yorkshire. Though the Chalk itself varies little, every downland farmer knows that its surface soils differ greatly in depth, texture, and fertility.

Improvements in technique, especially since 1939, have given much downland a high value for agriculture. But there remain many steep slopes and stretches of sterile soil where tree planting is the more profitable use of the land. The Forestry Commission has no less than thirty forests on the Chalk, and a large number of private owners are also concerned with plantations and shelter-belts.

In 1927 the Forestry Commission began a series of trials of various methods of afforestation, with different kinds of trees, at two typical Chalk forests, namely Friston on the South Downs, near Eastbourne in Sussex, and the Queen Elizabeth Forest, beside the Petersfield-Portsmouth road over the Hampshire Downs.

In this new bulletin, two of the Commission's research officers present a concise, well-illustrated review of over thirty years' experience at these and similar downland plantations.

Beech has emerged as the most successful all-round timber tree to raise as a main crop on chalk soils. But beech on its own is not easy to establish, and it benefits remarkably from the help of a 'nurse' tree. Scots pine and Corsican pine have proved the most reliable 'nurses', though fair results have

been obtained with European larch and several other conifers. All these coniferous 'nurse' trees are apt to fail when still comparatively young—between twenty and forty years old—because of a physiological disease called 'lime-induced chlorosis'. By that time, however, they have become big enough to be sold as poles, often at a fair profit, leaving the beech to grow on as the main crop and become sawmill timber.

Clearly, tree-growing on the Chalk is a specialized business, and anyone concerned with it will find this bulletin a sound investment. There is also enough background information to interest farmers, agricultural advisers, and students of ecology who have to deal with the wolds and downlands.

The chalk hills give us some magnificent scenery, but they also present many problems for plant growth, and this account of tree planting and tending will help everyone to assess the hills' peculiar characteristics for agriculture

H.L.E.

Plant Breeding Institute, Cambridge. Annual Report, 1960-61. *5s. 6d.*

The Report starts with a review of the work done at the Institute since 1948 on the breeding of field beans. Particular attention is now being given given to F_1 hybrids, because research has shown that they give markedly heavier yields than ordinary field stocks of beans. Other aspects being studied include winter hardiness, and resistance to disease and pest attack. A spring tick bean, Niki 7, has been produced which shows considerable resistance to pea leaf roll virus—a disease known seriously to affect the podding, and therefore the yield, of spring beans.

Two new winter oats, Barnwell and Feltwell, have recently been released and two new spring barley varieties will shortly be issued. One of these (HB.281/6/5/9) is the first mildew-resistant barley to be bred in this country.

Breeding for resistance to disease and pest attack forms a large part of the work of all sections of the Institute. Such problems as yellow rust and eyespot of wheat, root eelworm of potatoes, virus yellows of beet and *Verticillium* wilt of lucerne, to mention but a few, are receiving attention with the ultimate object of producing resistant varieties.

Although much of the Institute's work is concerned with the principal arable crops, grassland is not neglected. The work on grasses includes an intensive study of the tall fescues. North African tall fescues, by exhibiting high winter productivity, have shown a growth rhythm different from our usual agricultural grasses, and such importance is attached to this that an expedition has been organized to collect more material.

The agricultural research worker, adviser and progressive farmer—in fact, everyone interested in scientific plant breeding—will find valuable information in this Report. It is available from the Institute.

J.B.P.

Electricity on the Farm. ELECTRICAL DEVELOPMENT ASSOCIATION.

More farmers could make greater use of electricity. That briefly is the message of this book.

Not so many years ago the use of electricity on the farm was confined to lighting the farmhouse and providing power for a milking machine. Today there are very few tasks in and around the farmstead for which electricity cannot be used.

The human muscle is a poor thing compared with the power of a machine. In the chapter 'What a unit of electricity will do' it is interesting to learn that a ton of roots can be sliced for one unit. Gone, too, are the days when the last round on a winter's night was made in the flickering light of a hurricane lamp. Now cattle yards, barns and shippons may be floodlit at the touch of a switch; and the chapter on lighting adequately illustrates the basic requirements.

The needs of pig and poultry keepers are well catered for, and it is evident that there are few demands for heat and power where a supply of electricity cannot play its part.

Crop drying, potato storage and horticulture are all reviewed, and readers are reminded that most of the items mentioned are dealt with in greater detail in separate booklets issued by the E.D.A.

Copies of *Electricity on the Farm* are available free from the British Electrical Development Association Ltd., 2 Savoy Hill, London, W.C.2.

J.E.P.

Animal Disease and Human Health. (FAO BASIC STUDY NO. 3) *2s. 6d.*

The 'Freedom from Hunger' campaign was launched by FAO in 1960, and such books as this have an important part to play in making known the difficulties which beset an effective challenge to the malnutrition afflicting more than half the world's population.

Here the different types of disease (bacterial, virus, etc.) are discussed in relation to their distribution, the drain they exert on both human and animal efficiency, and the steps taken, or those which ought to be taken, to control and eradicate them. Non-infectious diseases of animals are also important. Genetic effects, deficiency diseases and the maintenance of unproductive herds also play their part in reducing food production. Great benefit is being derived from advances in veterinary medicines and practice, but the book rightly stresses the need for international co-operation if they are to be fully effective.

The study includes a useful 12-page, tabular statement on the diseases, the animals chiefly affected and the means by which the diseases are spread both to animals and to man. It is obtainable from H.M. Stationery Office.

A.J.L.L.

Books Received

About Biology. Karl von Frisch. Oliver and Boyd. 25*s*.

A Glossary for Bird Watchers. Michael Lister. Phoenix House. 8*s*.6*d*.

Diseases of Turf Grasses. H. B. Couch. Chapman and Hall. 80*s*.

Farm Management Handbook. University of Bristol. 5*s*.

Pictorial Poultry Keeping. George Newnes. 18*s*.

The Energy Metabolism of Ruminants. K. L. Blaxter. Hutchinson. 63*s*.

The Farm. Y. F. Booklet No. 1. Evans Bros. 3*s*.

The Ministry of Agriculture, Fisheries and Food. Sir John Winnifrith. George Allen and Unwin. 30*s*.

Timber in Building. A. L. Osborne. B. T. Batsford. 35*s*.

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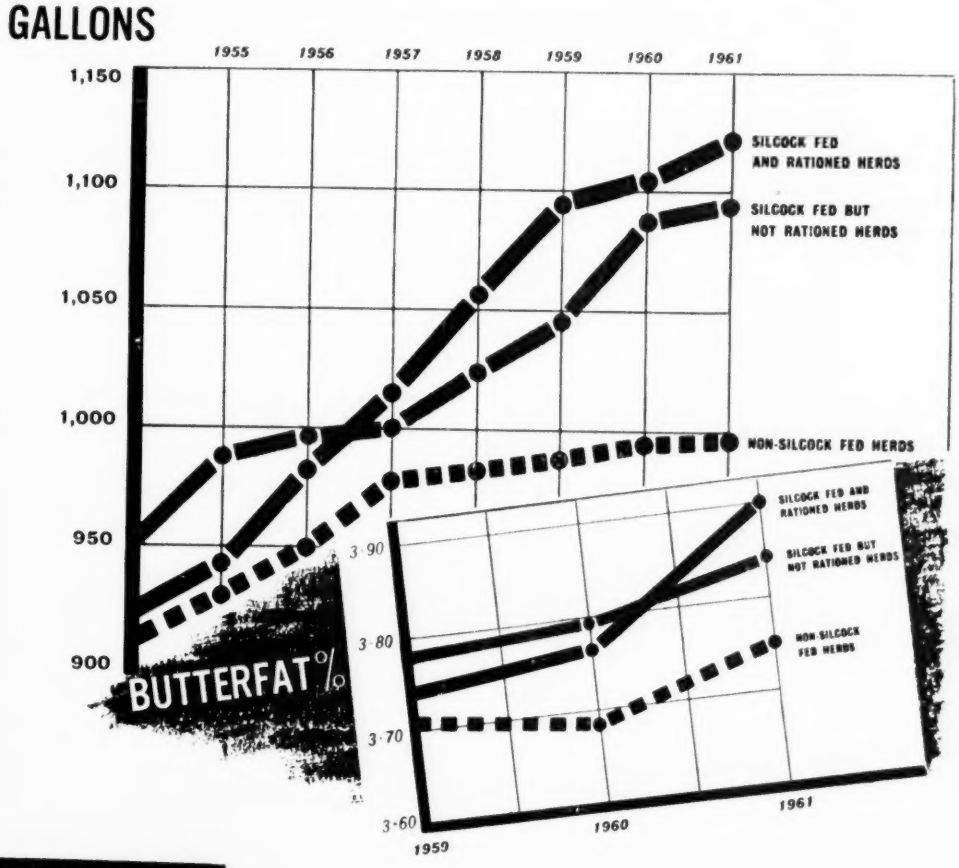
PROOF!

These figures are
extracted from this year's
National Milk Records Reports,
representing 6,500 herds
or almost a
quarter-million cows.

If figures speak
louder than words,
what further persuasion
can you possibly
need to put the
Silcock Proven Plan
to the test for milk
and butterfat?



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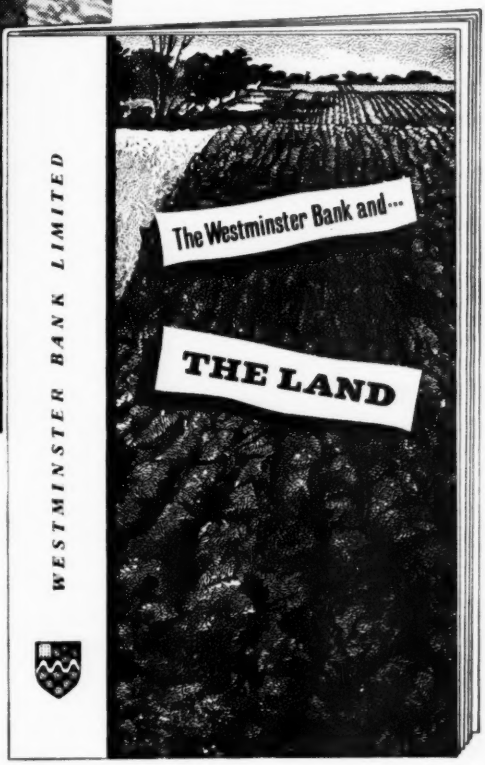
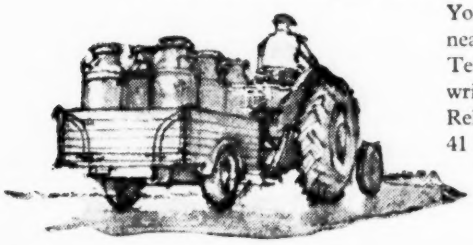
SILCOCKS

Farming with the Westminster



Thousands of farmers do it—and for a very good reason. They have found that it *pays* to bring the Westminster Bank into consultation in all matters affecting the development and finance of the farm (or the nursery or market garden). If you would like to know more about some of the ways in which our business can help your business, you should read our booklet

'THE WESTMINSTER BANK AND THE LAND'



You can get a copy at the nearest branch (address in the Telephone Directory); or you can write direct to The Public Relations Department at 41 Lothbury, London, E.C.2.

Westminster Bank Limited

OFFICIAL APPOINTMENTS

NIGERIA

Applications are invited from suitably qualified candidates for the following Contract appointments in the Public Service of the Government of Northern Nigeria.

1. **SPECIALIST OFFICER** (Botany & Plant Pathology)—Ref. NR.707

Qualifications: Honours degree followed by two years' post-graduate training in Botany and Plant Pathology.

Duties: General plant pathology investigations.

Salary: £972 per annum to £2,046 per annum gross, entry poin depending on years of experience, plus £100 or £150 per annum Gratuity. Free passages to and from Nigeria.

2. **HYDROLOGICAL SURVEYOR**—Ref. NR.676

Qualifications: A Diploma from a recognised University or School of Technology, which must include surveying, with at least two years' experience on hydrological projects.

Duties: Ground survey and hydrological work on river investigations.

Salary: £972 per annum to £2046 per annum gross, entry point depending on years of experience, plus £100 or £150 per annum Gratuity. Free passages to and from Nigeria.

3. **SENIOR AGRICULTURAL ENGINEER**—Ref. NR.679

Qualifications: B.Sc. Agricultural Engineering involving a four year course in general agricultural engineering OR A.M.I. Mech. E. with agricultural experience OR A.M.I.C.E. with mechanical bias including agricultural experience. Candidate should have appropriate experience of agricultural machinery and equipment, and practical experience in soil conservation work would be desirable.

Duties: The duties are of a general nature pertaining to Land Use and Development; survey; soil conservation projects; erection and maintenance of agricultural implements, machinery and buildings on Agricultural Stations of projects.

Salary: £1,944 per annum to £2,568 per annum gross, entry point according to experience, plus £150 per annum Gratuity. Free passages to and from Nigeria.

4. **AGRICULTURAL SUPERINTENDENT** (Mechanical)—Ref. NR.730

Qualifications: Ordinary National Certificate or City & Guilds Certificate OR Three years' apprenticeship in a Mechanical Engineering Work and experience in repairs and maintenance of diesel and petrol engines, agricultural tractors and implements.

Duties: Supervision of field operation of equipment and major workshops; organising ploughing schemes and repair services.

Salary: £906 per annum to £1,926, per annum gross, entry point according to experience, plus £100 or £150 per annum Gratuity. Free passages to and from Nigeria.

5. **FISHERIES OFFICER**—Ref. NR.360

Qualifications: Applicant must have a degree in Biology with emphasis on Zoology including, preferably, some work on fish and/or satisfactory completion of appropriate sections of Colonial Office Fisheries Officers' Course. A working knowledge of the French language would be desirable.

NIGERIA—*continued*

Duties: To execute plans for:
(i) Rational development of river fisheries.
(ii) Demonstration and organisation of peasant fish culture.

Salary: £972 per annum to £2,046 per annum gross, entry point depending on qualifications and experience, plus £100 or £150 per annum Gratuity. Free passages to and from Nigeria.

6. **HYDROLOGICAL ENGINEER**—Ref. NR.725

Qualifications: A Degree or Diploma from a recognised University or Technical College which exempts the holder from Parts A and B of the British Institute of Civil Engineers' examination with at least two years' experience on Hydrological work or a post-graduate course in Hydrological work.

Duties: To carry out Hydrological work in Northern Nigeria under the direction of the Deputy Chief Hydrological Engineer.

Salary: According to experience in the range of £1,440 per annum to £2,202 per annum gross plus £150 per annum Gratuity. Free passages to and from Nigeria.

Write, stating brief details of age, qualifications and experience, to:

The Recruitment Secretary (Overseas),
Northern Region Recruiting Agency,
Nigeria House,
9 Northumberland Avenue, London, W.C.2.

or telephone TRAfalgar 1244, Extension 145.